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VIEWS, NEWS AND INTERVIEWS.

The Mannesmann tube works at Remscheid, near Cologne, Germany, are now employing about 500 men who are engaged in making iron trolley poles by the Mannesmann process. Poles from 30 to 36 feet long, of varying section, are drawn in one piece. There is a great demand for this type of pole in Germany and other continental countries. The Mannesmann Tube Company are about to establish a factory in the United States to manufacture tubing for bicycle makers, and it is possible that the manufacture of trolley poles may also be undertaken.

Mr. W. H. Lawrence, manager of the electric light company at Sorrento, Me., is the Pooh Bah of that town. He is postmaster, town clerk, selectman, justice of the peace, express agent and manager of several local companies.

A sudden and unprecedented demand for cents has lately sprung up in various parts of the country, and the Philadelphia Mint has been turning out the bright copper coins at a rate unprecedented in the history of the establishment, says the New York *Sun*. Nine presses, with a capacity of $500 worth of pennies an hour, have been busy for weeks filling the demands. The reason of the demand is that in Philadelphia an eight-cent exchange fare has been established by the street car companies. In Detroit a three-cent fare has been established on the street railroads. Changes of a similar character have also been made in other cities.

The Pacific Cable Company, which was incorporated last week with a capital of $100,000, is chartered to run its own or leased wires from New York to California; thence under the Pacific Ocean to Japan, touching Hawaii and other islands on the way; thence to the continent of Asia and islands adjacent thereto, including the islands of Australasia. The company expects to eventually increase its capital stock to $8,000,000 or $10,000,000 and expects to begin laying its cable as soon as preliminary arrangements are concluded. Steps have been taken to secure the concessions necessary for landing the cable in Hawaii and Japan. As yet the plans of the company are in the formative stage.

It is reported that all the conductors, motormen and other employés of the Augusta, Ga., Street Railroad Company are going to visit the Atlanta Exhibition at the company's expense. Their fares will be paid and their salaries will continue during their absence at Atlanta.

OBITUARY.

Mrs. Emeline Westinghouse, mother of George, Jr., and Herman H. Westinghouse, died at the Windsor Hotel in New York city on December 10. Mrs. Westinghouse was born in Minaville, Montgomery County, N. Y., in 1810. Her maiden name was Emeline Vedder, and she came from a family well known in central New York. She married George Westinghouse, Sr., who was an inventor and manufacturer of agricultural implements, in Schenectady in 1828.

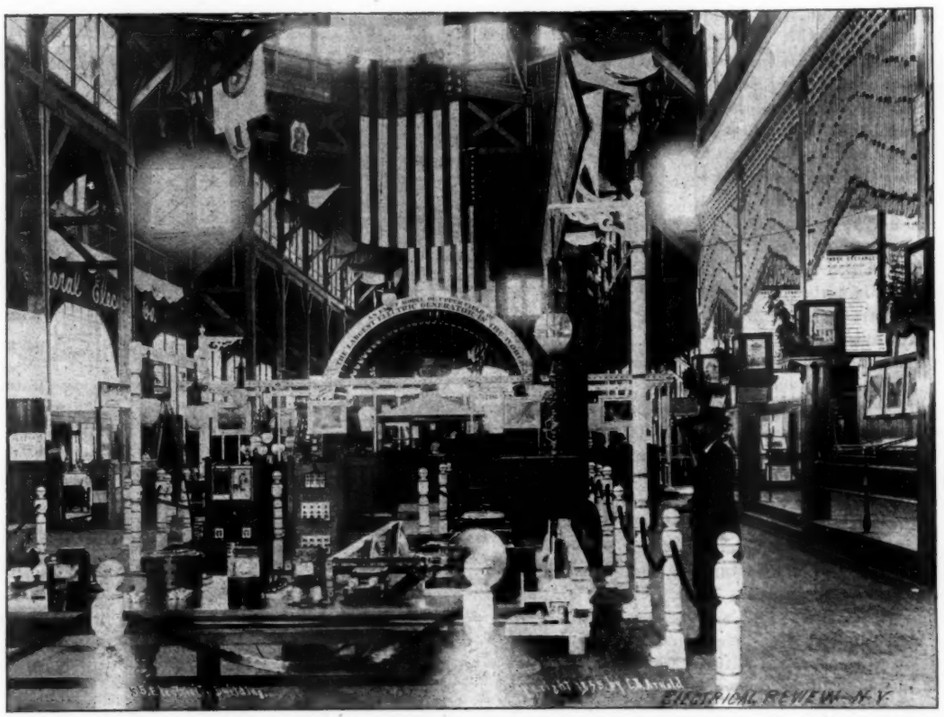

FIG. 1.—A GLIMPSE OF THE INTERIOR OF ELECTRICITY BUILDING, COTTON STATES AND INTERNATIONAL EXPOSITION, ATLANTA, GA.

THE COTTON STATES AND INTERNATIONAL EXPOSITION.

THE ELECTRIC LIGHTING DISPLAY AND OTHER ELECTRICAL FEATURES.

Almost every published account of the Cotton States and International Exposition at Atlanta, Ga., refers to its brilliant electric displays, and well do the management deserve commendation for their successful efforts, for they have most perfectly carried out a complete scheme to be detected even by a casual observer.

While not elaborate, a particular scheme or idea has been employed for the exterior illumination of every prominent building, which idea is developed most beautifully when darkness settles over the grounds. In some cases the outline of a building is shown by a fringe of incandescent lights, and in others the domes or towers are outlined in the same way; then again the arched entrances, windows and doorways are brought out prominently by this method of illumination.

The topographical advantages of the land materially aided this plan, the buildings being distributed not only around the Plaza and Lake, but placed to great advantage on different levels, and then terraced to meet the next level, giving an entirely new and novel appearance for what are generally considered as exposition grounds.

The Fine Arts and New York

State buildings, standing on the highest point, look down and over the Plaza and across the Lake, upon the Transportation, Electricity and smaller buildings upon a level nearly 80 feet below.

Added to the effect of these myriads of incandescent lights are to be noticed hundreds of arc lights illuminating almost every corner of the large area of 189 acres.

Powerful search-lights are also distributed around the grounds and operated from the tops of several buildings, and in the evening their rays are flashed upon the white buildings and upon the many white columns surmounted by statues, causing the latter to appear like pillars of white marble in the darkness. To make this effect more pronounced, the arc and incandescent lighting circuits are arranged so that the surrounding lights may be discontinued while the rays of the search-lights are thrown on the many pillars and statues.

Particular mention must be made of the Electric Fountain, constructed in the middle of one arm of the Lake. This fountain is one of the most elaborate ever seen at any exposition, having 17 distinct groups of outlets, and so arranged that powerful streams of water will rise from the outlets in many varied forms, sometimes towering upwards nearly 100 feet, then spraying in all directions, and then again appearing as sheaves of wheat standing separately on a field. During the evening the brilliancy of the effect is varied by the colored light rays of powerful arc reflectors, placed beneath each group of outlets in the usual manner of such fountains. By shifting screens of different colored glass over the reflectors the streams and sprays of water appear to have all the colors of the rainbow, which are blended perfectly in the changes. This feature of the Atlanta Exposition is operated frequently during each evening, during which time the surrounding grounds and buildings are darkened.

The reflective properties of still water are also taken advantage of at different points in the Lake by placing on the surface of the water and around the base of two spraying fountains circles of incandescent lights, in lily-shaped globes, thus producing the effect of water lilies sprayed upon by a fountain.

On the surface of the water at another point has been constructed a floating pillar, brilliant in whiteness and studded with 1,200 incandescent lamps, arranged in winding groups, which are automatically operated so as to cut in and out the different groups with startling effect. The arched bridge across the middle of the Lake is also fringed with many lights.

Even with all this electric lighting effect on the buildings, grounds and Lake, the exposition management, on two evenings of each week, have introduced another lighting display called the Baden-Baden illumination. This is most elaborately carried out by the Pain's Fire Works Company by hanging, from many 15-foot poles, festoons of thousands of Japanese lanterns along all the paths and walks of what is called the "Plaza," together with a countless number of small multi-colored prism lamps hanging scarcely a foot from the ground.

The plant supplying the current for all the electric lights, arc and incandescent, is located in the Machinery Building, and the generators form a part of the exhibits of the most prominent electrical manufacturing companies. All the mains or conductors are laid under ground, and carried even to the most distant point in wooden ducts.

The Electricity Building is a large structure and contains complete and elaborate exhibits of many electrical manufacturing companies, to mention which would be to give a list of the companies most prominently before the public in the different departments of electrical engineering.

We find modern types of multiphase alternating generators, transformers and motors, many of the latter operating some machinery; also various forms of direct-current low-tension generators, with numerous switches, cut-outs and instruments, both measuring and recording. The chloride accumulator is well exhibited, showing the application of storage batteries in operating sewing machines, kinetoscopes, phonographs, miniature lighting effects, together with a complete electric launch exhibit with the component parts of each boat's equipment.

In the same building and the Transportation Building are to be found many exhibits of electric railway motors fitted to familiar forms of trucks connected to the car controller ready for operation, so that inquisitive inquirers may note the ease of operation.

The accompanying illustration, Fig. 1, on the preceding page gives one view of the interior of the Electricity Building, but the many exhibits are so closely grouped as to be hidden from view from any one point of observation.

Electricity also serves to transport the visitors over the Lake by day and evening, for a fleet of the familiar World's Fair electric launches passes to and fro, every boat carrying passengers from landing to landing or around the Lake, giving a most favorable view of the different buildings, of which the Woman's Building has perhaps the best location.

These launches have been handsomely housed in a boat-house constructed at one end of the Lake, the general appearance of which is shown by the accompanying illustration, Fig. 4. It is located among a group of trees, forming the only grove within the exposition grounds, although there are many large trees growing here and there around the different buildings. Visitors have an opportunity of noting the details of charging the batteries of these launches, for a complete and handsome switchboard is in full view, the current being supplied by underground mains leading from one of the generators in Machinery Building, used for illuminating purposes.

The electric launches are decorated with many Japanees lanterns during the evening, and with their passengers present a handsome spectacle as they are seen in the darkness moving over the Lake and under the illuminated bridge.

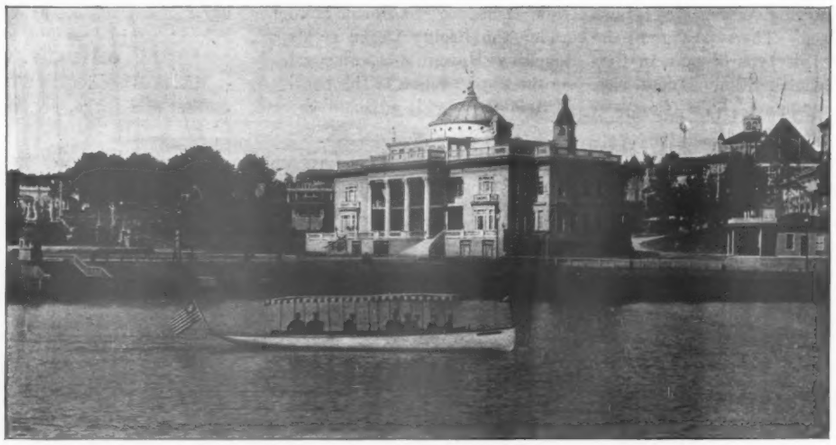

FIG. 2.—WOMAN'S BUILDING, COTTON STATES AND INTERNATIONAL EXPOSITION.

The Swiss National Exposition.

The Swiss National Exposition, which begins at Geneva, Switzerland, May 1 next and terminates October 15, bids fair in the matter of interesting novelties to surpass any national display made since our Centennial. A full account of its scope is given by United States Consul Ridgley at Geneva in a report to the State Department, and he says that Swiss residents in America are invited to make exhibits.

Probably because Theodore Turrettini, Mayor of Geneva, and one of the most distinguished electrical engineers in Europe, is president of the exposition, the electrical exhibit will be the finest ever seen. The River Rhone supplies 12,000 horsepower, to be electrically transmitted six miles to the grounds. There will be a traveling foot path, operated by electricity, traversing the great Machinery Hall.

The Production of Pure Zinc.

An article by Herren Mylius and Fromm is abstracted in the *Electrochem. Zeit.* for October. To try to purify zinc by dry methods leads to no favorable results. The wet process can be carried out only with the aid of electrolysis, and this can be done in two ways—by the deposition of the metals from purified solutions with insoluble anodes, or by electrolytic refining with the use of soluble anodes of zinc. In their researches they used pure solutions of sulphate of zinc and obtained the following results: The pure zinc of commerce contains in all cases noticeable quantities of cadmium, lead and iron. A solution of sulphate of zinc can be purified electrolytically so that chemical analysis cannot find any heavy foreign metals; zinc oxide is easily obtained by a chemical process, with the same purity; the electrolytic zinc obtained from zinc sulphate or oxide contains appreciable quantities of platinum, which comes from the anode; the purest zinc is obtained by the repeated electrolytic reduction of the metal in basic zinc sulphate solutions, from which it is obtained in a spongy state, and must be melted in vacuum. The metal so obtained is not absolutely pure, but contains, at least, 99.99 per cent of zinc. With the electrolytic decomposition of zinc the secondary decomposition of water can not be prevented entirely. The formation of spongy zinc takes place by the action of the oxygen.—*London Electrical Engineer.*

The Standard Telephone Company.

[*From the Pacific Electrician.*]

The criticisms on the Standard Telephone Company have at last forced that concern to attempt a reply. The reply takes up two columns of the ELECTRICAL REVIEW, and while appearing to deal with the various charges that have been made, it is altogether too vague to inspire confidence.

There is no question but that the Standard company is a fake concern, organized for stock jobbing purposes. The ELECTRICAL REVIEW, which has been very conservative in its treatment of this concern, refers to its reply as the "pronunciamento of this very untelephonic telephone company."

ELECTRICITY AT THE NATIONAL CAPITOL.

BY GEORGE H. DRAYER.

For the past half a dozen years or more Congress has been endeavoring to secure electric lighting facilities for the United States Capitol.

Originally there was installed by the Westinghouse company a small trial plant in the Senate wing of the Capitol building, and later one in the House wing. At first only a small number of lamps were placed in the most prominent committee rooms, but electric lighting soon began to grow in favor among Senators and Representatives, and within a short time the demand for this mode of illumination was so great as to necessitate overloading the small machines installed, making it a very dangerous experiment. At the last session of Congress, however, an appropriation was made for a new electric lighting system for the Capitol, with a plant of sufficient capacity in both wings. Two engines of 140 horse-power each, of the Westinghouse make, have been placed on each side, down in the subterranean vaults, each direct connected with a 75-kilowatt direct-current 125-volt generator, with a total capacity of 6,000 lamps of 16 candle-power each. The engines of either wing are capable of rendering full service for the whole building, and they are so arranged that they can be used interchangeably in case of accident or derangement of part of the plant. An attractive feature of the new system will be a set of powerful electric signals on the summit of the great white dome.

Heretofore when either house has been in session at night that fact has been indicated by a lamp displayed from the dome, visible at a distance. But nobody could ever tell from it whether the House or the Senate alone or both houses were in session. In the new signals a red electric light will denote that the House is in session and a blue light the Senate, while both red and blue, with white thrown in for color effect, will announce that both houses are sitting simultaneously.

On the House side there have been recently installed two modern, latest improved steel boilers, with nickel finish, especially for the electric plant. On the Senate side two boilers of the same make, placed there some time ago in connection with the heating and ventilating department, have been turned over for the use of the plant at that end.

The wiring on the Senate wing has all been removed or overhauled, and new wire put in its place, owing to the fact that that portion of the building was wired for an alternating system when the small trial plant was placed there.

The switchboards are of white marble, extra finish, and with nickel trimmings, all connections being made on the back. They are very handsome, and are models of neatness and design.

The plants come under the direct supervision of the architect of the Capitol, and under the superintendence of Mr. Chris Glem, who, for many years, was employed by the Westinghouse company.

Electricity is not only used for incandescent lighting at the Capitol, but is utilized in many ways. Both Congressional halls have always been lighted by gas, there being over 1,000 burners over the Senate Chamber and more than twice that number over the Hall of Representatives. They are lighted by an electric battery system, which necessitates turning on the flow of gas for some time before the jets are ignited, thus causing the chambers to become filled with a disagreeable smell, which is a source of much complaint. Before the present series arc lamps had been perfected, some were placed over the Senate Chamber for the purpose of demonstrating their availability, but the flickering of these lamps caused so much annoyance that they were soon ordered out. Welsbach burners were also tried, with but little success, and now it is contemplated using the so-called incandescent arc lamp.

Another innovation in the House will be made in the method of summoning page boys to the desks of representatives. Hitherto, ever since Congress has been in existence, the members have called up the pages by lightly clapping their hands together—a method open to criticism and often the cause of much inconvenience. When a considerable number of members clapped their hands at the same time the ordinary confusion of the House Chamber was increased ten-fold and oftentimes an eloquent orator on the floor could not make himself heard above the din. All these annoyances will now be obviated. Electric wires have been strung from each member's desk to an indicator and call board in the cloak rooms, similar to those in hotel offices, and each desk will be supplied with a push button for starting the current, so that all a statesman may have to do when he wants a page will be to press the button and the page will appear.

A similar plan has been proposed, though it may not be adopted, to facilitate voting and eliminate the long and tedious oral yea-and-nay roll call. This plan contemplates running electric wires from the members' desks to a large indicator located in front of the Speaker's table, where it can be seen readily, so that when the yeas and nays are ordered a vote may be taken all at once by means of pressing the buttons. In this way members can show whether they are paired and whether their vote is yea or nay, all in a few seconds, whereas it now takes from 30 to 45 minutes to finish a roll call. If the new electric system for summoning the pages works well it will be the forerunner of further uses of electricity in the conduct of both houses.

Another invaluable innovation will be a separate and special telephone directly connecting the House and Senate for speed and certainty of communication between the two bodies. Heretofore the only telephonic communication available was had through the central exchange down the city.

When the Capitol was built, over 100 years ago, none of our modern time-saving devices and conveniences were thought of, and nearly all communication between the two houses was effected by messengers.

An improvement still more useful will be provided in the shape of a continuous bulletin of proceedings in both houses, to be displayed in the lobbies, giving a brief outline of the proceedings at frequent intervals, like telegraphic bulletins from national political conventions.

A perfect running chronometer will also be established in the private lobby of the House, electrically connected direct with the National Observatory, where the Speaker can consult the exact time and convene the House on each day's session exactly on time.

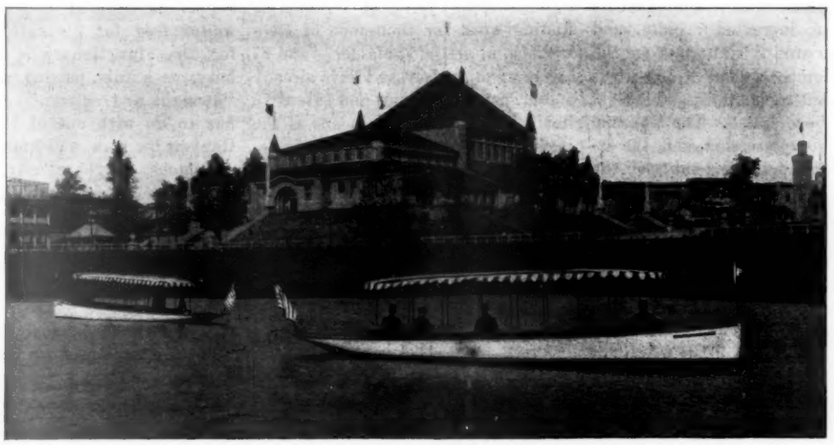

FIG. 3.—AGRICULTURAL BUILDING, COTTON STATES AND INTERNATIONAL EXPOSITION.

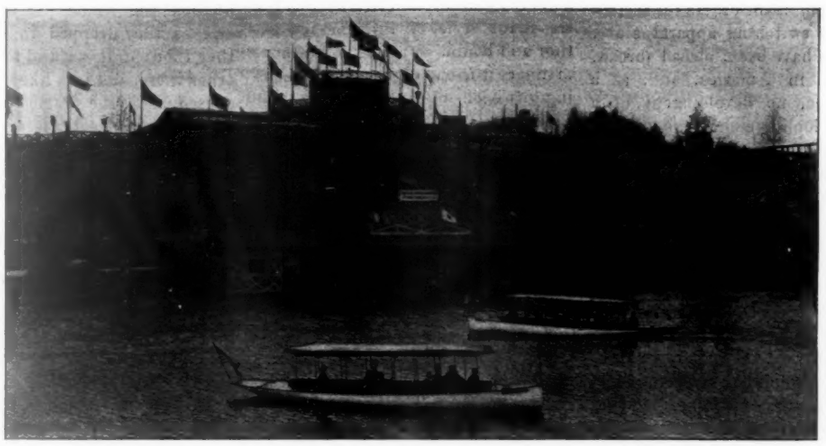

FIG. 4.—ELECTRIC LAUNCH BOAT HOUSE, COTTON STATES AND INTERNATIONAL EXPOSITION.

Mayor Strong issued permits last week to the street railroad companies of New York city for the use of snow ploughs and sweepers, with the usual conditions attached. These conditions require the companies to clear the snow not only from their tracks but for two feet on either side of their tracks and to cart the snow away.

MUNICIPAL TELEPHONY.

ABSTRACT OF A PAPER READ BEFORE THE NORTHERN (BRITISH) SOCIETY OF ELECTRICAL ENGINEERS, NOVEMBER 11, 1895, BY A. R. BENNETT.

(Concluded from page 339.)

It must not be supposed that low rates are peculiar to Norway. Of the 31 exchanges in Holland, all but three enjoy rates ranging from £4 19*s.* 1½*d.* per annum down to £2 9*s.* 7*d.* per annum, and these rates have proved remunerative to the undertakers. Sweden, Denmark, Switzerland, Luxemburg and Finland, all afford additional examples of cheap, and yet remunerative, telephony.

But what experience have we in this country calculated to show that these low rates are as practicable here as on the Continent? A good deal if we examine the history of the last 15 years.

The rate of the Dundee and District Telephone Company was £5 10*s.* per annum for any distance, and it paid an average dividend of nine per cent during the four and a quarter years of its existence. To buy it out the National had to return its capital with 40 per cent added, besides paying bonuses to the chief officials. The cost of the lines erected by the company was £15 each. The Sheffield Telephone Company paid good dividends for many years on a £7 rate. The Sheffield people still enjoy better terms than the other large towns, since when the National company acquired their system they were enabled by threatening to call in an opposition company to stipulate for a special tariff, which is still in force. The tariff is as follows:

	Per annum.
For distances not exceeding one and one-half mile	£8 0 0
For distances not exceeding two miles	£10 0 0
For each additional half mile beyond two miles	£2 10 0
For private houses not exceeding two miles	£7 0 0

These are much lower terms than those current in Manchester, Liverpool or Glasgow, yet, as they exist, we may be sure that they are remunerative.

The Globe Telephone Company, which commenced an opposition exchange in London at £10, was bought over at an early stage in order that the monopoly rate of £20 might be maintained; the same fate subsequently overtook the New Telephone Company, which obtained 3,600 subscribers in London at a £12 12*s.* 0*d.* rate. Such an enterprise would have been fatal to the National company's London exchange, and had to be bought up regardless of cost.

But the best and most recent example incurred in your own city of Manchester, where the Mutual Telephone Company constructed an exchange in 1891 at rates which varied from £5 for shareholders in the company to £6 for non-shareholders. The Mutual company introduced many improvements, and gave a service which was, I believe, unanimously regarded as much superior to that of its rival. The cost of connecting the Mutual subscribers by double wires was £16 16*s.* 0*d.* each; the average subscription, after deducting 10 per cent for post office royalty, was only £4 12*s.* 0*d.* per line, a figure which approximates closely to the average receipts in Christiana; and yet, after putting aside five per cent on the capital expended for deterioration, paying directors' fees and all working expenses, sufficient surplus was left to pay a dividend, had it been so desired, of 2.29 per cent per annum. This was in the third half-year of the exchange's existence; subsequently the revenue increased rapidly, and with it the profit. At one time the Mutual company had 1,389 lines working, but such a formidable rival could not be tolerated. The National company got possession, and the exchange will shortly be a thing of the past, although about 1,000 lines are still connected to it. Soon those subscribers who, for the last five years, have been paying from £4 to £6 for a good service, will be called upon to pay £10 per annum, or go without telephonic communication.

There is only one other aspect of the situation to which I will call attention before concluding: it is the woeful effect which the existing monopoly is having upon our electrical industry. Abroad, immense quantities of telephonic apparatus are required to meet the rush of subscribers, and everywhere—in France, Germany, Belgium, Switzerland, Sweden, Norway—we find extensive factories already in existence which are devoted entirely to the production of telephonic switchboards and apparatus, and more are continually coming into being. At Christiania I was shown a large building, still incomplete, which is being erected to meet the rapid extension of the Norsks Elektrisk Bureau's telephonic business. We have nothing of the kind in this country. Why? Because all important orders for instruments and switching apparatus are, and always have been, placed abroad, principally in America, and, as a consequence, no development of a British telephonic instrument industry has been possible. It is true that the Mutual Telephone Company used practically nothing but British made apparatus, not because it was British only, but because it was of better design and better construction; but that was only a small indication of what would occur if telephones were free. Let those who have had experience of the rival systems in Manchester say which has given the most satisfaction—that of the National company, whose apparatus is exclusively American, or that of the Mutual company, whose apparatus was nearly exclusively British. The suppression of the existing monopoly in telephone exchanges would not only give the subscribers reduced rates and better service, but would practically create a new home manufacturing industry for the influences or prejudices which at present direct the orders for apparatus into foreign channels, and would not, it is to be hoped, hold sway with municipalities, or with many competing companies.

Furthermore, the freeing of the telephone industry would provide an outlet for much of the surplus capital of the nation which is now locked up for want of legitimate fields for employment, or, what is worse, is lent to unstable foreign states, or devoted to the development of foreign countries. Much has been heard lately of the absolute necessity of opening up new markets in Africa and elsewhere; but we have at hand a means of employing at least some of our surplus capital at a profit; of finding work for thousands of electricians, of artisans, of clerks and of laborers; of, in fact, as I have already stated, creating a new and extensive home industry. That means is the reversal of the existing policy of telephonic monopoly.

LITERARY.

Collier's Weekly for December 12 gives up a page to an excellent sketch of Biltmore, George Vanderbilt's manorial home in North Carolina. It is by S. Millington Miller, M. D., and is far above the average Southern sketch.

The *Inland Printer's* Christmas number is a good one. A characteristic Bradley design in black, green and red occupies the front cover. As usual, this number contains many bits of knowledge interesting and valuable to the craft.

There is a toboggan slide at St. Moritz, Switzerland, three-quarters of a mile long, that has been descended in 71 seconds. *Scribner's* for January will publish a description of it, with a number of pictures from instantaneous photographs.

"In the Midst of Paris," by Alphonse Daudet, is the title of a new book to be published this month by Platt, Bruce & Company, of New York, and intended specially for the holiday season. Written in the trenchant style of this famous author and bound in a most sumptuous manner, it is one of the most charming gift books of the season.

"St. Ives," the novel left substantially complete and unpublished, by Robert Louis Stevenson at his death, is described as purely a romance of adventure. It is the story of a French prisoner captured in the Peninsular wars, who is shut up in Edinburgh Castle; there he falls in love with a Scotch girl who, with her aunt, frequently visits the prisoners. There is early in the story a duel under extraordinary circumstances between St. Ives and a fellow-prisoner; after various episodes a dangerous plan of escape is decided upon, and the daring St. Ives finally becomes a free man. The perils that he undergoes while in hiding about Edinburgh, his adventures on the Great North Road with strangers and robbers, his final escape across the border into England, his subsequent return to Edinburgh, and many other incidents of this splendidly conceived story are told in the spirited, vivacious and wonderful style of which Stevenson was a master.

Henry, the Telephone and the Poker Game.

It is generally known that in the clubs in Southern cities the great American game of draw is played without let or hindrance on the part of zealous house committees, says the New York *Evening Sun*. Often several games are going on at once in one club, and when once started they may be kept up till late. No matter what the limits of the game may be, a kitty is always kept, out of which a supper is ordered and the darky waiter feed for his extra services, for that functionary is kept very busy, as a rule, passing around the "straight and seltzer." This story has to do with one of these ebony Ganymedes at a well-known club in a famous Southern city. For a long time he had been prospering on his poker perquisites. Then for some reason interest in the game slackened and his income fell away.

Something had to be done to start the game going again. He knew it was only necessary to bring a few of the regular players together to start a game as they would strike under the circumstances like flint. Henry finally had an idea, and he put it into execution. In the town in question telephone rates are cheap, and the instruments are in many private houses. One night, seeing only one player about, and no signs of a game, Henry went to the telephone and rung up one of the regulars.

"What is it?" came over the wire.

"This is Henry at the club," audibly groaned Henry. "Mr. Mason's down stairs, sir," and then Henry quit the 'phone.

Then he rung up another member. Him he informed that two of the regulars were in the house. By turns he had the whole party informed, and as they dropped in one by one they thought it natural to find each other there, and in a likewise natural consequence the game was played with the usual satisfactory effects—to Henry.

This scheme worked swimmingly for a while. Then one evening when the regulars were not present and Henry had brought them up with the turn, one member said:

"By the way, Dick, didn't I tell you I didn't want to play poker to-night?"

"Well, I didn't ask you," replied Dick, who was losing.

By this time seeing the approach of a storm, Henry began to slide toward the door.

"Didn't you ring me up on the 'phone?" said the first speaker.

"No, I didn't; some one rang me up."

"And me."

"Here, too," exclaimed one after the other.

Then they looked at each other and called for Henry and drinks. As the culprit entered, with one accord they gave vent to that soul-satisfying exclamation of the Southron: "Well, damn that nigger, anyhow!"

Boston Electric Light Company.

The business of the Boston Electric Light Company is progressing steadily and satisfactorily, undisturbed by rumors of municipal ownership or other little political side shows which are always apt to crop up around election time, and the directors are gratified to find an increase of about 15 per cent for the first five months of this year over the corresponding months of last.

The work of placing their wires under ground is being steadily carried on, the territory specified by the commissioners to be covered during the year '95 being already completed, and further operations being well in hand.

In connection with this work the cables furnished by the Safety Insulated Wire and Cable Company, of New York, are being largely used and President Gilbert informs me that during the 18 months they have been in operation they have given the best of satisfaction. They are furnished from specifications supplied by the lighting company, with the idea of bringing the insulation feature to the highest state of perfection and show most gratifying results.

It has always been the aim of the Boston Electric Light Company to put into the construction and operation of their plant only the best that money could buy, and the consequence is that to-day they have as fine an outfit in every detail as can be found in the United States. H. G. T.

Boston, Dec. 14.

The Volatilization of Carbon.

M. Moissan, according to the London *Electrical Engineer*, finds that when carbon is volatilized in his electric furnace it evaporates without melting, and that when the vapor condenses it always deposits as graphite. He also finds that aluminum carbide may be made, mixed with metallic aluminum, by the direct reduction of alumina with carbon in the electric furnace, and that when this carbide is treated with water it evolves chiefly marsh gas or methane (CH_4), not acetylene. This promises to furnish a new starting point for the methyl compounds and derivatives, which have hitherto been derived from the products of distillation of wood; and it casts some light upon the cause or origin of natural gas.

Brooklyn Trolley Mail Cars.

On Monday of this week the Brooklyn Heights Railroad Company, of Brooklyn, N. Y., invited a number of people to inspect the new railway post office cars which have been built by the company for the use of the Brooklyn postal authorities. These cars are built on a thoroughly up-to-date design, and each is equipped with a safety fender.

The druggists of Louisville, Ky., are objecting to the proposed plan of the Ohio Valley Telephone Company to install nickel-in-the-slot telephones in drug stores.

Thirteen at Dinner on the Thirteenth.

Mr. H. M. Littell, president of the Atlantic Avenue Street Railway Company, and Mr. S. S. Whitehouse, attorney of the company, entertained a party of 13, Friday evening, December 13, at the Montauk Club, Brooklyn. The dinner was particularly fine, and grew out of a wager between the two gentlemen named over the result of the recent Brooklyn election. The toasts were happily selected, Mr. Littell telling "How to Win a Dinner;" Col. J. N. Partridge, "How to Run a Trolley Car;" Judge Neu, "How to Run a Newspaper;" Judge Kenna, "How to Mend the Machine," and Mr. Whitehouse, "How to Run an Election." The event was particularly pleasant in its informal arrangement, and the loser of the wager, Mr. Whitehouse, was consoled by the thought that "It is an ill wind that blows nobody any good."

The Alpha Sign Lamp.

The Dickinson Electric Supply Company, 150 Nassau street, New York city, have just placed upon the market an attractive novelty called the Alpha sign lamp, which is illustrated herewith. As will be noticed from the cut, the novel feature consists in the shape of the lamp bulb, which is made of pressed glass in such a form that the top presents a flat surface on which a letter of the alphabet is etched. The background is filled in with black. The lamps are fitted with Westinghouse bases, which fit into sockets arranged in a line on a sign board. All letters of the alphabet are supplied and the words composing the sign may be changed as often as desired. The lamps can be made of a size to show letters six inches high. For show windows the Alpha sign lamps would seem to be especially adapted.

THE ALPHA SIGN LAMPS.

The J. G. Brill Company.

The J. G. Brill Company, of Philadelphia, is probably the most widely known house engaged in the building of electric cars and trucks. A traveler, who had recently visited nearly all the leading cities of the United States, stated to the ELECTRICAL REVIEW that he had become impressed with the enterprise and success of one Philadelphia concern, the J. G. Brill Company. He claimed to have seen their name on the street cars of every city visited.

The ELECTRICAL REVIEW is glad to chronicle this expression of an observing traveler and congratulates the progressively-managed house above mentioned on its continued and well-merited success.

ELECTRIC RAILWAY NOTES.

Three hundred and ninety-one thousand dollars of the Terre Haute, Ind., Electric Railway Company's outstanding first mortgage bonds have been listed on the New York Stock Exchange.

It is reported that a Cleveland syndicate has secured control of the entire street railway system of Ft. Wayne, Ind. The new company is the Consolidated Electric Railway Company; capital, $1,500,000.

The Long Island Traction Company, of Brooklyn, N. Y., was sold by auction on December 13 to J. G. Jenkins, of Brooklyn National Bank, for $5,500,000. He represents the reorganization committee.

The West End Street Railway Company, of Boston, has declared its regular semi-annual preferred stock dividend of $2 (four per cent) per share, payable January 1. Transfer books closed December 17 and reopen December 26.

It is reported that the franchise granted to the Newtonville & Watertown Street Railway Company for a street railway line from Watertown, Mass., to Boston has been revoked, the company having failed to lay rails within the prescribed time.

Mayor Pingree, of Detroit, was put off a car by a negro conductor on Tom Johnson's line last Saturday because he refused to pay a five-cent cash fare. The Mayor is trying to force the company to sell eight tickets for a quarter and the company refuses to do it until it gets new franchises it wants.

A new street railway company in Brooklyn, N. Y., is known as the Brooklyn Bridge, Prospect Park & Eastern Railroad Company, and in the legal notice it is announced that it desires to become a corporation for the purpose of securing a franchise to construct a surface railroad covering about 44¾ miles of track.

A press dispatch from Wrentham, Mass., says that the plans for the development of the street railway service in eastern Massachusetts, while not formally arranged, are extensive and practically include all of the territory in the eastern part of the commonwealth, west of the Boston suburban business. There is said to be an understanding between two companies now in the field by which business can be divided between them with mutual advantage.

The Wayne Telegraph and Telephone Company has secured a franchise from the village of Lyons, N. Y., in return for allowing city officials free service and establishing a telephonic fire alarm system.

National Board of Fire Underwriters.

The National Board of Fire Underwriters held a meeting in New York city on December 10 to revise the rules for the installation of electric wires. Among those present were Messrs. Cabot and Goddard, of Boston; Hornsby, of Chicago; Stern, of Denver; Lauder, of Concord, N. H., and Anderson, of New York. A great deal of discussion was indulged in, which frequently degenerated into personalities of an acrid character.

The action of the New York Board of Fire Underwriters was severely criticised for passing, on March 20, 1895, the following resolution:

Resolved, That the superintendent be authorized, until further notice, to approve the use of the Attix tube and wire, when equal in quality and insulation to the samples submitted to this Board and tested, under the same conditions where tubing would be permitted; provided that there is no splicing or tapping of the wire, but that its introduction shall be in all cases by the loop system; that in new buildings when necessary to carry it between floors and plastering it shall be through holes bored in the beams, not less than two inches apart, a single conductor in each hole, out of the reach of nails; and in old buildings where necessary to carry it within the reach of nails it shall be protected by some device from perforation; and provided further that the wire and tube be carried intact into the cut-out boxes, and that in no case shall the outer covering be removed before introducing the core wire into the cut-out box.

The use of American Circular Loom Conduit as such was also severely criticised. It will be some time before the proceedings of this meeting, which was supposed to be held in secret, will be officially published.

The American Street Railway Association.

The officials of the above association met at the Southern Hotel, St. Louis, last week and made arrangements for the meeting in that city next October. President Littell and the members of the Executive Committee were present. The Southern Hotel will be the headquarters and the number of rooms already engaged indicate a very large attendance. The hospitable street railway men of St. Louis will see that all comers are made welcome.

The Stirling Boilers.

The Stirling company, Pullman Building, Chicago, manufacturers of the popular Stirling water tube safety boilers, now have 350,000 horse-power of their boilers in use. The chief advantages claimed for them are safety, efficiency and durability. The Stirling company has branch offices at 126 Liberty street, New York; Betz Building, Philadelphia; Equitable Building, Baltimore; 8 Oliver street, Boston.

The Brooklyn Heights Railroad Company will pay $195,000 for this year's taxes to the city of Brooklyn, N. Y.

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SPECIAL NOTICE TO ADVERTISERS.

***CHANGES** for advertisements must be in this office by Friday noon for the following week's issue. NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication the following week.*

NEW YORK, DEC. 18, 1895.

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Memorandum for electrical men: "During 1896 I will do everything in my power to legitimately aid in increasing the electrical business." Read that three times—there's something between the lines.

Nearly all the important water powers in the United States are under the control of capitalists who either have installed electrical generating plants, or who are making plans for such installations. We are led to believe that great advances will be made in this branch of electrical work in the way of extensions to existing plants and the construction of new ones during 1896.

Remember that a most satisfactory Christmas present to give any one in any way connected with the electrical or allied interests is a year's subscription to the ELECTRICAL REVIEW, "the New York *Sun* of the electrical field." Owing to an oddity of the calendar there will be 53 regular issues of the ELECTRICAL REVIEW during 1896. But the price remains the same as it has been heretofore for 52 issues—three dollars.

We are glad to learn of the satisfactory progress now being made in the application of electric motors to the direct driving of printing presses. A number of large installations have recently been made and others are in prospect. The efficiency of an electrically driven press over one operated by belting is often remarkably higher, and in almost any case is more than sufficient to warrant the extra expense of the motor.

The Brooklyn bridge has never been happily managed. Everything done to it since the structure was completed has been done piecemeal, apparently the result of afterthought after afterthought. Mr. Roebling, the great builder, if alive would be in constant anguish of spirit over the city terminal arrangements and the multitudinous accidents. A perfect signaling system, to our mind, one that would prevent the many collisions and uncertainties, may be found in a telephone system. It could be so planned that by means of sliding contacts, every car would be in circuit carrying its own telephone, and every train could be in thorough control from either end. A system of this kind would bring additional and much-needed safety to the several hundred thousands of Brooklynites and New Yorkers who daily pass through this knot-hole. Let the bridge trustees think it over.

WALL STREET AND THE ELECTRICAL STOCK MARKET.

There is little probability that anything in the way of currency legislation will be attempted until after the holidays. This is the view taken by Wall Street, and accounts for the continuation of the waiting policy that has been so pronounced since Congress convened. The market, thus left to the professional element, has, during the week under review, consisted largely of manipulation with a view of scalping profits first on the long and then on the short side. The barometric stocks—like St. Paul, Northwest, Rock Island and Burlington—show very little net change. A ripple of excitement was caused in the coal group by an agreement on the part of producing interests to restrict production during the balance of the Winter to 50 per cent of their capacity.

I have instituted a very general inquiry among reputable Stock Exchange houses making a specialty of unlisted securities. I find that the demand for this class is greater than it has been at any time since the early Spring, when there was a revival of speculation as a result of the Belmont-Morgan bond purchase. One of the favorite mediums of investment are the stocks and bonds of the street car roads. And, strange as it may seem, there is some demand for securities of this kind issued against the English lines. The demand for home roads is as yet very discriminating, those of a doubtful value or earning power being rigorously avoided. Some houses attributed this revival of interest to the successful operation of the underground trolley on the Lexington avenue line. This, it is claimed, will revolutionize the surface transit business in large cities. Many of the bonds and stocks of electric, horse and cable roads are selling on a five and five and one-half per cent basis. They are regarded equal to a first-class railroad security, and well they may be when the record of recent railroad insolvencies of all descriptions is brought under scrutiny.

An event that will have an important bearing on the electrical industry will be the rehabilitation of the Long Island Traction Company which is to shortly follow the sale of that property that occurred on Thursday of this week. It means a more intelligent, economic operation, the purchase of needed equipment and ultimate extensions.

I had an interesting chat this week with a capitalist enjoying the confidence of the Electric Storage Battery Company's managers. I pointed out the fact that the stock had dropped some 35 points in six weeks, or an amount equal to about its present value, and asked him in view of this fact to explain why it is not in better demand if it be as great an Eldorado as claimed by its promoters. He said that insiders were all wealthy men, had made their turn around 70 and were

now picking up stock between 30 and 40. He said that the policy was to allow the stock to remain around present figures pending important extensions. It seems that the manufacturing capacity of the company is limited. This is to be materially increased during 1896. Upon its accomplishment there will be a basis, consisting of actual earnings, on which to put the stock at par and keep it there. At the present time its earnings are comparatively small, in view of which fact the price of 70 would look ridiculously high and might invite attack. The common stock opened the week at 37¼ and the preferred at 38. The high points were touched on Friday, being 38¾ and 40¼, respectively.

There was only a ripple of interest in General Electric this week. It was furnished by a bear drive on Thursday which carried the stock from 31 down to 29¼. There was a subsequent recovery.

The Western Union Company, concerning which so much has been written of late in connection with the Union Pacific decision, declared its regular 1¼ per cent dividend, payable January 15 to stock of record December 20. It showed a surplus for the December 31 quarter, partly estimated, of $264,505 after interest, sinking fund charges and the dividend noted. This is an increase of nearly $100,000 as compared with the corresponding quarter in 1894. It is suggestive as indicating an increase in general business.

The Edison Electric Illuminating Companies of New York and Brooklyn made their usual monthly statements. Each shows gratifying increases. No transaction in the Brooklyn company's stock was recorded. The bonds sold at 110½. The regular quarterly dividend of 1½ per cent was declared on the stock, payable January 15, to stock of record January 1. The New York company's stock sold at 95¾ and the old 5 per cent bonds at 98½.

The American Telegraph and Cable Company recorded two transactions, one being at 94 and the other at 95.

The American Bell Telephone Company will distribute, on January 5, to stockholders of record December 31, a dividend of 3 per cent regular and 1½ per cent extra, making 15 per cent for the year.

On the Boston Exchange Bell Telephone advanced from 199½ to 202½ upon announcement of the regular and special dividends. Erie Telephone was featureless at 62. New England Telephone was unchanged at 87½. Westinghouse common dropped 1 per cent to 33 @ 33½. The preferred was quoted at 54½ @ 55.

BAIN.

New York, December 14, 1895.

A kitten fell into the 18-foot flywheel of the engine in the electric railway plant at Milltown, N. J., the other day and was found dead when the engine stopped. She had revolved for eight hours at a speed of 86 revolutions a minute.

PHILADELPHIA EDISON ELECTRIC LIGHT COMPANY vs. THE ABENDROTH & ROOT MANUFACTURING COMPANY.

A VICTORY FOR THE BOILER COMPANY.

On November 19, 1895, a suit was begun by the Philadelphia Edison Electric Light Company, of Philadelphia, against the Abendroth & Root Manufacturing Company, of New York city, to recover $34,000. A countersuit was put in by the Abendroth & Root Manufacturing Company against the Philadelphia Edison Electric Light Company for $6,830.99. This suit was tried in the United States Court in Brooklyn before Judge Wheeler and a jury, and a verdict has now been rendered in favor of the Abendroth & Root Manufacturing Company for the amount of the countersuit.

The Abendroth & Root Manufacturing Company are the manufacturers of the well-known Root Water Tube Boiler, and between the years 1889 and 1891 they furnished the Philadelphia Edison Electric Light Company with about 3,500 horsepower of boilers, these boilers being supplied on four different contracts, each of which followed the other at short intervals.

Soon after these boilers were erected and in operation in the Philadelphia Edison plant, a series of troubles followed, which finally culminated in a fatal accident. This brought the matter into the Coroner's Court in Philadelphia, where, after a careful investigation by a jury of experts, a verdict was rendered acquitting the Abendroth & Root Manufacturing Company and holding the Philadelphia Edison Electric Light Company responsible.

The troubles mentioned were due, as claimed by the Philadelphia Edison Electric Light Company, to bad workmanship, bad material and faulty design, and also due to the contractors failing to comply with all the articles agreed upon in their contract, and on these grounds they brought the suit just closed, in which they sought to recover $34,000, which they claimed they had spent in remedying the so-called defects.

The Abendroth & Root Manufacturing Company claimed that the plaintiffs had not paid them all that was due on their orders for boilers, and also for additional material furnished to them, and on these grounds they brought the countersuit mentioned above. The Abendroth & Root Manufacturing Company succeeded in establishing the fact that they had lived up to every article of their agreement and had even done more than they agreed to do.

The counsel for the Philadelphia Edison Company were Tracy, Boardman & Platt, and the counsel for the Abendroth & Root Manufacturing Company were Benedict & Benedict and Witter & Kenyon, of New York. The plaintiff brought in as an expert Prof. Spangler, of Philadelphia, while the defendant brought in as experts Dr. C. E. Emery, of New York, and Prof. R. C. Carpenter, of Sibley College, Cornell University, Ithaca. Prof. W. D. Marks, of the Philadelphia Edison Company, and Mr. Albert A. Cary, of the Abendroth & Root Manufacturing Company, also testified as experts on their respective sides.

ELECTRIC LIGHT FLASHES.

The Edison Electric Illuminating Company of Brooklyn, N. Y., makes the following showing for November:

	1895	1894	Increase
Gross	$77,728	$50,018	$27,709
Net	36,960	30,129	6,831

The statement for November of the Edison Electric Illuminating Company of New York, including the Manhattan and Harlem companies' is as follows:

	1895.	1894.	Increase.
Gross. ..	$179,590.54	$172,844.28	$6,755.26
Net.....	90,755.48	92,495.46	*1,739.98
Gross. 11 months..	1,658,976.33	1,493,284.45	165,691.88
Net, 11 months..	799,189.86	716,443.10	82,746.26

*Decrease.

The Jersey City, N. J., Board of Street and Water Commissioners on December 12 awarded the contracts for lighting the city for the fiscal year which began December 1. The entire cost for the year will be $104,000. The People's Electric Light and Power Company, of Newark, will furnish 340 arc lights at $90 each per annum; the Hudson County Electric Light Company, 360 arc lights at $110 each.

The Chicago Edison company has closed a deal by which it acquires the property of the Chicago Warehouse Company at Washington and Market streets, opposite the arc light and power station. For the property the company gave its note for $60,000 and assumed an obligation of $62,000. The purchase was made for the purpose of extending the plant, which, it is thought, will be necessary within a short time.

The New York City Gas Commission made the awards last Saturday for the city lighting for 1896. The electric lighting contracts were placed as follows:

Brush Illuminating Company, 720 lamps at 40 cents a night and 92 at 45 cents; Madison Square Electric Company, 312 lamps at 40 cents and 10 at 50 cents; Mount Morris Electric Light Company, 361 lamps at 40 cents; Harlem Electric Light Company, 212 lamps at 40 cents and 19 at 50 cents; Manhattan Electric Light Company, 241 lamps at 40 cents; Edison Electric Light Company, 165 lamps at 50 cents.

The City Comptroller is anxious to have the electric lighting system extended to all parts of the East Side, and, if necessary, will ask for special legislation to give the Board of Electrical Control authority to construct subways enough to double the electric lighting of the city.

Since its exposure of the Standard Telephone Company and its methods, the ELECTRICAL REVIEW has received numerous congratulations and a great many offers of assistance from persons who have had experience with the company. We thank our friends and will call upon them if necessary.

TROLLEY PATENTS IN LITIGATION.

WESTINGHOUSE AND GENERAL ELECTRIC EACH WIN A VICTORY.

Judge Townsend, of the United States Circuit Court, rendered an important decision on overhead trolley patents at New Haven, Conn., on December 7. The case was that of the Thomson-Houston Electric Company against the Winchester avenue Railroad Company, of New Haven, and others. The patents in dispute were Nos. 495,383 and 495,443, both issued on April 11, 1893 to Charles J. Van Depoele, originally the property of the Thomson-Houston Electric Company, and later owned by the General Electric Company.

Patent No. 495,443 was broadly sustained by the court. Judge Townsend describes the invention as "embracing the long, swinging, pivoted, hinged and upwardly springpressed arm, extending from a support on the top of the car and equipped with an underrunning contact device." The defense contended that the alleged invention was made by an employé of the Van Depoele company; lack of patentable novelty in view of the prior state of the art, and that the same invention had been previously disclosed by and patented to Van Depoele. Judge Townsend held, however, that the utility of the invention was conceded and that infringement had been proved.

Patent No. 495,383 was declared invalid because it was not esteemed a practicable invention. It was for improvements in the system broadly claimed in No. 495,443, and embraced an overhead contact device and switch. The court, referring to No. 495,383, concludes its opinion as follows:

Its adoption results not from its patentable novelty but from its practical utility in connection with the main invention. The doctrine that utility, in the absence of patentable novelty, is immaterial, is especially applicable where the sole foundation for the claim of utility lies in the mere mechanical adaptability of a well-known device to a novel invention protected by a valid patent.

Let a decree be entered for an injunction and an accounting as to the claims in patent No. 495,443 and dismissing the bill as to patent No. 495,383. Let costs be taxed in favor of each party, as each succeeds as to one patent, but let judgment be entered only for the excess of the costs of one party over the other.

The defendant company in the suit is a licensee of the Westinghouse Electric and Manufacturing Company; therefore, the matter was, in fact, one between the Westinghouse and General Electric companies. Judge Townsend's opinion covered 26 typewritten pages, and the testimony in the case occupied nearly 6,000 pages. An appeal from Judge Townsend's decision will be taken to the United States Circuit Court of Appeals.

The Southern Massachusetts Telephone Company has opened its new exchange at Brockton, Mass. The new switchboard has a capacity of 2,000 subscribers and about 6,000 calls a day come into the exchange.

TELEPHONE NEWS AND COMMENT.

The telephone exchange in the city hall at Bangor, Me., was recently burned out.

The Western Union Telegraph Company, on December 11, declared a regular quarterly dividend of one and one-quarter per cent.

The Erie Telegraph and Telephone Company made a net gain of 103 subscribers in November. Total number connected, 18,421.

The Police Commissioners of New York city hope soon to get established a telephone signal system for the use of the department.

An ordinance recently passed compels the Missouri & Kansas Telephone Company to place its wires under ground in the business district of Kansas City, Mo.

The Southern New England Telephone Company is installing a "village system" at Mystic, Conn. The rate will be $18 a year, and 25 subscribers can be accommodated.

Twenty-six citizens of Franklin, Mass., have petitioned the selectmen to grant privileges for establishing a telephone exchange to the New England Telephone and Telegraph Company.

The Nixon Telephone and Electrical Supply Company, of Providence, R. I., have asked permission to install a telephone system at Stonington, Conn. It is understood that if the company secure the desired permission it will endeavor to connect Stonington with Westerly, R. I.

General Manager U. N. Bethell, of the Metropolitan Telephone and Telegraph Company, has sent to each telephone subscriber in New York city an interesting booklet, entitled "Your Telephone Service," which contains valuable information intended to aid every one in securing the utmost efficiency from their telephone service.

Mr. Baker, of New Hampshire, introduced a bill in the House to regulate the charges for telephone service in the District of Columbia. The bill fixes a maximum rental of $50 a year for telephones on separate wires; $40 where there are two telephones on a wire; $30 where there are three on a wire, and $25 where there are four or more.

People are daily beginning to appreciate the telephone more and more. One evening last week the son of the proprietor of a New York store was accidentally locked in. He went to the telephone, called up police headquarters, and stated his predicament. The nearest police station to the store was then informed of the matter over the telephone by some one at headquarters and a policeman was sent around to the store to get the young man out.

The directors of the American Bell Telephone Company on December 11 declared a regular quarterly dividend of three per cent and one and a half per cent extra, payable January 15 to stock of record December 31. Books close January 1 to January 15, both days inclusive. This makes a total of 15 per cent declared this year, 12 per cent regular dividend and three per cent extra, one and a half per cent being declared June 12 and one and a half per cent extra December 11.

It is reported that the Erie Telegraph and Telephone Company has on file at its executive office in Lowell, vouchers representing an expenditure to date of $3,500,000 cash, in reconstructing and extending its plant. This is over $70 per share actual cash put into the property, and does not include the original cost of plant, which was about $2,000,000. The property has paid in dividends $2,275,000. This includes dividends paid Erie stockholders and the American Bell company.

During the recent severe storm in Chicago a number of employés of the American Telephone and Telegraph Company were sent out to look for "trouble." The landscape was slightly obscured by snow and other flying things, but one gang of men made out what they supposed to be a trolley wire occupying a place that belonged to one of the long-distance wires, so they promptly cut it down and hacked it up a little for luck. Eventually it was discovered that it was a small cable belonging to the long-distance company.

The Southern New England Telephone Company has placed the whole of the $150,000 of new stock recently authorized, making a total of $1,650,000. This money from the increase of stock has been largely used in paying for a new plant in the shape of wires placed in underground conduits. The past year the company has placed a considerable amount of underground wire in New Haven, Conn. The company has an arrangement with the city whereby the conduits for fire wires are utilized. At present the telephone wires in the center of the city are pretty much all under ground. The underground service has also been availed of in the business centers of Norwalk, South Norwalk and Stamford, and extensions have been made in Hartford, Bridgeport and Danbury. The company have now 1,500 telephones in use in New Haven.

The Philadelphia Councils' electrical committee at a recent meeting took up the oft-considered Drawbaugh telephone bill again. President Stokes, of the company, was present, as was also Attorney Keen. Both gentlemen were plied with questions. One was: "Who are the officers of the company?" When their names were given the committee asked for the amount of the subscribed capital, and they were told it was $100,000. This was followed up by asking Messrs. Stokes and Keen if they were prepared to do business, and if they had the facilities for handling a satisfactory service. Both questions were answered in the affirmative. Messrs. Stokes and Keen were reminded that under the terms of the ordinance they had no right to sell or transfer their privileges, after which it was decided to refer the bill to the City Solicitor for his opinion regarding it.

Any subscriber to the New York city telephone system who wishes to be notified of important weather changes and forecasts may now receive such notice, free of charge. In this class of information will be included news of heavy storms, cold waves, warm waves and snow storms. Extra telephones have been installed in Farmer Dunn's weather foundry in the tower of the Manhattan Building, and prompt information about the weather will hereafter be on tap. Mr. Dunn says that the new arrangement was to meet a growing demand for the latest information on the part of business men, who have had to rely chiefly heretofore on the two regular daily forecasts. Similar arrangements for telephonic reports will probably be made throughout the country. The chief of the weather bureau has written to the forecast officials in all the principal cities to provide such accommodation.

A press dispatch says that there is to be telephone competition in Hyde Park, Ill. The United Telegraph, Telephone and Electric Company, with a capital of $1,000,000, has been formed and its first exchange will be opened about January 15. John G. Earle is president, E. P. McConnell, secretary, and Thomas W. Sennott, general manager. The franchise under which the company is to operate was granted to the Hyde Park District Telegraph and Electric Company. It covers all the territory east of State street and between Thirty-ninth and 138th street. These boundaries embrace about 50 square miles and a population of 300,000. It is under this franchise that the Postal Telegraph Company entered Chicago and all its wires in the Hyde Park district are laid under its authority. The United Telegraph, Telephone and Electric Company, which purchased the franchise, has been at the work of construction about six weeks.

An important decision has been handed down by the New York State Court of Appeals in the case of H. Wilson Blashfield against The Empire State Telephone and Telegraph Company. In the years 1884, 1887 and 1890, the defendants erected telephone poles along the highway in front of the premises of 68 residents of the towns of Homer and Scott, N. Y. Before the commencement of this action the parties so injured assigned their claims to the plaintiff, who brought this action to recover damage. The case was tried before a referee who gave plaintiff judgment for $795.81 damages and $1,280.81 costs. The defendants appealed to the General Term, which court reversed the judgment, and from that judgment the plaintiff appealed to the Court of Appeals, which court reversed the judgment of the General Term and affirms that of the referee with costs. The plaintiff claimed that the placing of the poles was an additional burden upon the fee, beyond the use of the highway for the purposes of public travel, and that the property owners were entitled to compensation therefor.

The history of the Southwestern Telegraph and Telephone Company in Texas during the past three years has been one of progress and prosperity, in spite of the general depression. During the past year its long-distance connections have been extended until its patrons can talk to each other from any of the large cities in the State, and it has expended about $600,000 for improvements in Southwest Texas alone, besides acquiring considerable property in the shape of office buildings. It now has in course of construction exchanges at Yoakum, Taylor, Marlin, Orange and Galveston, the one at the latter point to be the finest structure devoted to telephone purposes in the South. During the year 1895 the company has put in 250 miles of new metallic circuits, which figure will be more than doubled in the coming twelve months, and in 1896 much new territory will be entered. The first extension of any importance will be from La Grange to Port Lavaca. Corsicana is soon to have full connection with North and South Texas and the line from Austin to San Antonio is being rebuilt. Work will be begun at an early day on a line along the Southern Pacific from Houston to San Antonio.

The Metropolitan Telephone and Telegraph Company, of New York city, is preparing plans for a modern building to be erected on its property in Dey street just in the rear of its Cortlandt street building. On January 1 it will open two new exchanges in the northern part of New York city, which will make 13 city exchanges operated by the company. One of these exchanges will serve the territory on Washington Heights and vicinity and will probably be known for the sake of euphony as the Highbridge exchange. The other office will be known as the Melrose exchange and will serve the territory below Tremont and above Harlem on the East Side. Subscribers in this locality will hereafter be free from the mileage tolls heretofore in vogue and will be on the same basis as other city subscribers. The Metropolitan company has been operating the Greenwich, Conn., exchange since September 1. This office was formerly controlled by the Southern New England Telephone Company. The Metropolitan company has rebuilt the exchange and has made many improvements in the service and is now extending its lines to include the aristocratic suburb of Belle Haven.

TESTS OF A TEN-HORSE-POWER DE LAVAL STEAM TURBINE.

READ BEFORE THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS, DECEMBER, 1895, BY PROF. WM. F. M. GOSS.

The de Laval steam turbine experimented upon constitutes a part of the permanent equipment of the engineering laboratory of Purdue University, and the present paper is based upon data secured chiefly through the assistance of Charles E. Bruff, B. M. E.

In the de Laval steam turbine, jets of steam delivered from suitable nozzles are made to impinge against

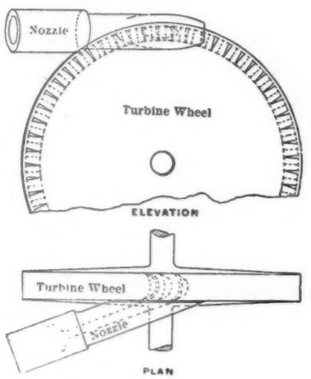

FIG. 1.—ARRANGEMENT OF NOZZLE AND WHEEL, DE LAVAL STEAM TURBINE.

the buckets of a light turbine wheel. The steam enters the buckets from one side of the wheel, and passing through is discharged or "exhausted" from the opposite side. The arrangement of nozzle and wheel is shown by Fig. 1. The motion of the turbine shaft, which, under the action of the jets, is extremely rapid, is communicated by gearing to a heavier and slower-moving driving shaft carrying a flywheel of small diameter; from this wheel the power of the engine is delivered. Regulation of speed is secured by means of a throttling governor, which controls the pressure of the steam admitted to the nozzles.

The important moving parts, with approximate dimensions, are shown by Fig. 2. The turbine wheel is built of 63 steel segments, each carrying a bucket and a portion of the light outside rim. The segments are held in place by means of suitable collars, which grip them on either side. The wheel is mounted upon a long, slender shaft, having sufficient flexibility to allow the system at speed to revolve about its center of gravity, even though this may not agree with the geometrical axis of the shaft. The gear upon the turbine shaft is of steel, solid with the shaft; that upon the drive shaft has its teeth formed in a bronze ring, which is carried by a solid iron center. The smaller gear has 21 teeth, the larger one 208 teeth, giving a ratio of 1 to 9.90476.

The shafts run in bronze boxes completely lined with babbit or other soft metal. To assist in the distribution of oil a spiral curve, the pitch of which is about half the diameter of the journal, is cut into the metal of the bearing. The outboard bearing on the turbine shaft is closed at the end and a small pipe runs from the closed end to a point over the gears. The pumping action, resulting from the presence of the spiral oil way, gives a constant though small supply of oil upon the gears. The gears do not dip in oil, though the case which incloses them receives drainage from all the bearings.

The governor is connected with the driving shaft, of which, at first sight, it appears to be but an extension. It is shown in detail in Fig. 2. The weights, W W, with their arms, C C, are in the form of a split cylindrical cup. Upon the outside and at the base of each weight a knife edge, E E, is formed which bears upon a suitable surface in the governor frame, A A. A spiral spring is fitted at its inner end with two projecting pins, which bear upon the arms, C C, of the governor weights. The outer end of the spring is connected with the frame by the threaded plug, D. When the governor is at rest the concave surfaces of the weights are in contact with the frame, and the tension of the spring keeps the knife edges upon their seat. When the governor is revolving at speed the weights are under centrifugal action and move outward, swinging upon their knife edges against the resistance of the spring. The motion of the weights is taken up by the pin, F, by which it is communicated through suitable mechanism (not shown) to the governor valve above the engine.

The nozzles which serve to deliver steam to the wheel are four in number, and are so fixed in the frame of the engine as to act upon the turbine wheel at points which are equally distant from each other. Two of the four are provided with stop-cocks, which, when closed, put out of action the nozzles with which they are connected. By means of the stop cocks, therefore, the engine may be run under the action of two, three or four nozzles, at will of the engineer.

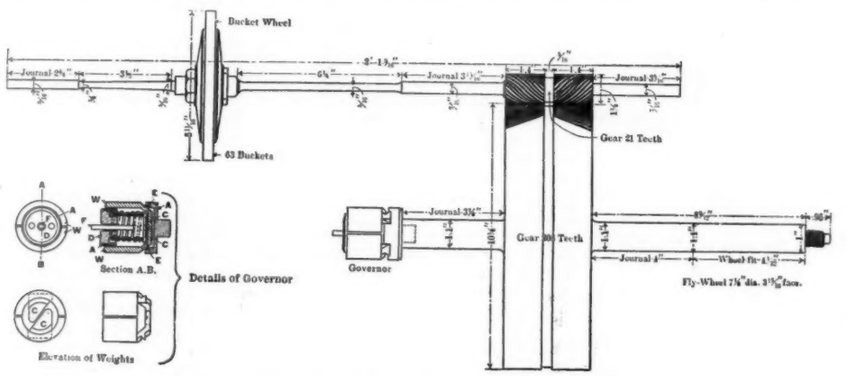

FIG. 2.—IMPORTANT MOVING PARTS, DE LAVAL STEAM TURBINE.

The distinguished feature of the engine, perhaps, is to be found in the form of the nozzles. All are diverging, the throat or smallest diameter being approximately two inches from the discharge end. Three have a diameter in the throat of 0.138 inch and one a diameter of 0.157 inch.

It is assumed that the form of the nozzles is such that the pressure of the steam as it passes from the orifice will be that of the surrounding medium, and, since the flow is nearly adiabatic, it is clear that if this condition be realized all the energy of pressure is transformed into energy of motion before the steam is allowed to impinge upon the buckets of the turbine wheel. The medium surrounding the nozzles in the machine is practically that of the exhaust, so that the expansion from the pressure of the boiler to that of the exhaust is complete before the steam has contact with any moving part of the machine.

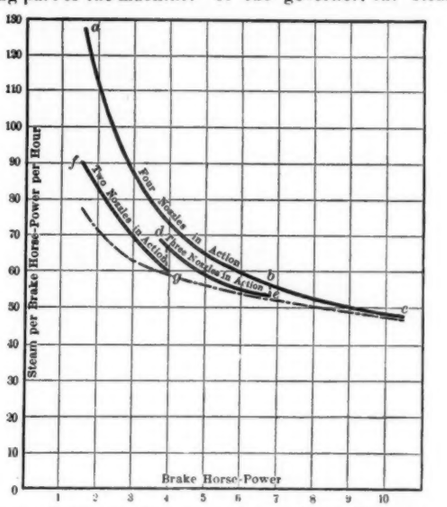

FIG. 3.—EFFICIENCY CURVES, DE LAVAL STEAM TURBINE.

Lateral motion of the driving shaft is limited by contact between the large gear and the bearings on either side. With this shaft fixed, the double spiral of the gears makes lateral motion of the turbine shaft impossible. All forces, therefore, tending to displace the turbine wheel laterally are transferred to the slow-moving shaft, where ample rubbing surfaces can be provided without seriously impairing the efficiency of the machine through frictional losses—a happy solution of an otherwise difficult problem. When it is remembered that the parts shown (Fig. 2) are those of a machine capable of developing 10 horse-power, that the driving shaft under normal conditions makes 2,500 revolutions a minute and the turbine shaft practically 10 times as many, the opportunity for the display of good design and workmanship may be better appreciated. Viewed as a piece of mechanism, the engine appears to merit high commendation, both as to design and workmanship; but the service which has thus far been obtained from it is not sufficient to show the effect of long-continued use.

THE TESTS.

The power of the engine was absorbed by a Prony brake, cooled by constant streams of water. The exhaust steam was piped to a Wheeler condenser open to the atmosphere. The water resulting from condensation was drained into tin buckets, which were changed and weighed at regular intervals.

Gauges were used to show the steam pressure both above and below the governor throttle, the former giving the pressure available at the engine, and the latter the pressure under which, in consequence of the action of the governor, the steam was admitted to the nozzles. A manometer was also attached to the exhaust pipe, but as this pipe is large (three inches in diameter) and the connection with the condenser close, the observed pressure was never appreciably different from that of the atmosphere.

The boiler pressure for all efficiency tests was 130 pounds by gauge, for which pressure the particular nozzles used were designed. The rated speed of the flywheel is 2,400 revolutions per minute (23,771 for turbine wheel), but this standard was not maintained for all the tests. The governor was adjusted several times as the work progressed, and it was not until several tests had been run that the proper speed was secured. It is believed, however, that the differences of speed recorded do not materially affect the value of results for purposes of comparison.

The tests are grouped in three series, the first including those for which all four nozzles were in action, the second with three, and the third with two. The several tests in each series were intended to vary from each other only in amount of power delivered from the wheel. All tests were of 30 minutes' duration, and all observations were taken at five-minute intervals. The conditions of each test were maintained with such uniformity that the observations of any five-minute interval were very nearly identical with the average of all observations taken for the test.

It will be seen that, with all four nozzles in action, and with the engine developing a little more than its rated power, the steam consumption per horse-power per hour is as low as 47.8 pounds. In comparing this result with results obtained from other engines, the small size of the engine tested (10 horse-power) should be kept in mind, and also the fact that the rate of consumption stated is based upon brake power. The efficiency of the engine falls off rapidly as the load is decreased, and, as would be expected, the effect is most marked when all the nozzles are in action. This may best be seen by means of the three heavy-lined curves given in Fig. 3. Assuming the

nozzles to be cut out of action one at a time, as soon as the reduction of load becomes sufficient to permit the work to be done without them the minimum steam consumption at different loads, for the boiler pressure and speed employed, is represented by the broken line *f, g, d, e, b, c,* Fig. 3. Again, if, instead of four nozzles, an infinite number could be employed, and if the governor could be arranged so as to regulate the number in action rather than the pressure admitted to them, the steam consumption of the engine in question might be made to follow a line somewhat similar to the light broken line *g, e, c.* But the heavy lines indicate the results which were actually obtained.

The engine requires very little attention and is almost noiseless in action. The governor is quick to act, and its speed regulation appears to be fair, except when changes of load are large and suddenly made. After such a change, the engine requires a little time before settling down to steady running under the new conditions.

STARTING POWER.

As the speed of the de Laval engine is high, it is evident that the force in action must be comparatively low. To determine the maximum resistance under which the engine might be expected to start, the brake was clamped upon the flywheel so that the latter could not turn within it. Steam was then admitted to the engine, and readings were taken from the scale under the brake arm. The result of this process, of course, depends upon the steam pressure and the number of nozzles in action. With all nozzles, and with a steam pressure of about 125 pounds by gauge, the maximum starting power is equal to a force of 30 pounds acting at a radius of one foot. The following tabulated data (Table II) give the starting power for different pressures, and when two, three or four nozzles are in action :

TABLE II—STARTING POWER OF ENGINE.

	Four nozzles in action.		Three nozzles in action.		Two nozzles in action.	
Steam pressure by gauge.....	125.2	71.1	125.2	71.1	125.2	71.1
Effective radius of break arm, feet.....	1.5	1.5	1.5	1.5	1.5	1.5
Reading of scale under brake arm, pounds..	20.0	12.1	14.1	9.0	9.5	6.0
Equivalent force in pounds, acting at a radius of one foot....	30.0	18.2	21.2	13.5	14.3	9.0

Young Men's Institute.

The evening classes at the Young Men's Institute, 222 Bowery, New York city, report a large enrollment this season. One of the most popular is the class in electrical engineering, taught by Mr. R. H. Mansfield, S. B. The enrollment in the class includes workers from all fields of the practical applications of electricity. They are taught the fundamental principles of the science and also its latest developments. By means of text books, lectures and some experiments a comprehensive view is taken of the whole subject. Other subjects taught are commercial branches: Arithmetic, Book-keeping, Shorthand, English Grammar; and technical branches: Carriage Drafting, Steam Engineering, Architectural Drawing, Mechanical Drawing, Freehand Drawing. Some of these require a two and some a three year course. A new term will be begun January 2, 1896. Young men between the ages of 17 and 35 are allowed to enroll at any time.

STORAGE BATTERY APPLICATIONS.

A Topical Discussion before the American Institute of Electrical Engineers, New York and Chicago, November 20, 1895.

COMMUNICATION BY CARL HERING ON "PAST AND PRESENT OBSTACLES IN THE STORAGE BATTERY DEVELOPMENT."

The great and numerous advantages of a satisfactory electric storage battery have been described so often and are so well recognized and admitted by the unbiased that it seems unnecessary to again enumerate and discuss them here. The question which the engineer and constructor should discuss at present is not "Is a battery desirable?" but rather "Why is it that storage batteries seem to have been unsatisfactory?" and the question which concerns the capitalist is "Does it pay in dollars and cents to use the storage battery even if it be kept in a satisfactory condition by the makers?"

TABLE I—A SUMMARY OF RESULTS OF TESTS.—DE LAVAL STEAM TURBINE.

Nozzles.	Number of test.	Revolutions per minute of belt wheel.	Brake horse-power.	Steam Pressures by Gauge. In boiler.	Steam Pressures by Gauge. In engine below governor valve.	Total pounds of steam per hour.	Pounds of steam per brake horse-power per hour.
All four nozzles in action, three having a diameter in throat of 0.138 in. and one a diameter in throat of 0.157 in.	1	2,138	0.00	130	17.1	120.8	.....
	2	2,545	1.63	130	42.2	210.3	128.6
	3	2,038	2.36	130	48.5	230.8	99.8
	4	2,118	2.97	130	55.6	254.6	85.7
	5	1,917	3.46	130	61.9	275.5	79.6
	6	2,072	4.38	130	70.8	313.0	71.5
	7	2,128	5.10	130	76.9	328.5	64.4
	8	2,576	7.52	130	99.6	403.0	53.6
	9	2,153	8.24	130	104.4	422.8	51.3
	10	2,411	10.33	130	126.3	491.8	47.8
Three nozzles in action, two having a diameter in throat of 0.138 in. and one a diameter in throat of 0.157 in.	11	2,584	0.00	130	31.3	121.4	.....
	12	2,112	3.95	130	83.6	267.8	67.8
	13	2,125	4.77	130	93.4	286.0	60.0
	14	2,490	6.50	130	111.7	346.3	53.3
Two nozzles in action, each having a diameter in throat of 0.138 in.	15	2,546	0.00	130	42.2	99.3	.....
	16	2,049	1.95	130	83.5	162.6	83.4
	17	1,909	3.43	130	121.1	222.9	65.0
	18	2,412	3.87	130	127.0	229.6	59.3

The latter question can be disposed of here in a few words. If the makers guarantee to keep the battery in a satisfactory condition for a certain rate per annum, or if they rent them, then it becomes a mere matter of calculation to find whether it pays or not; but this calculation must be made for each specific case, as the cost of the batteries and their maintenance seem at present to be such that an estimate for a general case can hardly be considered conclusive, the margin being in many cases too small. In some specific cases it will be found to be decidedly cheaper, in some it will be doubtful, and in some decidedly too expensive. Limiting ourselves to this country and judging in a general way from the number of storage battery installations, it would seem that the price at present (including, of course, the cost of maintenance) is such that in perhaps the majority of cases the margin of profit to the user is so small or so doubtful that it does not balance the supposed risk. The commendable practice of renting relieves the purchaser of this risk, which then leaves the question a mere matter of cost. A material reduction in the first cost and cost of maintenance would therefore at once turn the tables in many cases so decidedly in favor of the storage battery, that there would be little doubt left as to the economy and it would render the practice of renting unnecessary in most cases. Cheapness, therefore, is one of the most important points which affect the outlook of the storage battery.

To return to the first question, "Why is it that storage batteries seem to have been unsatisfactory?" we must limit ourselves to this country, as probably thousands of tons are and have been in successful use abroad. In Germany, for instance, almost every one of the large continuous-current central stations is equipped with a battery plant; in England they are used very largely for private plants, as also for central stations; an English firm recently claimed to have sold a total of "six miles" of accumulators placed in one continuous row, and a French firm is stated to make several tons a day.

The chief reason why so few storage battery plants exist in this country seems to have been that the accumulator companies have for years been so busy fighting each other's patents and have spent so much money in this litigation, that they have had neither time nor money left to manufacture and install their batteries. But all this litigation has now come to an end, thanks to an enterprising company which has bought up all the little life that is left of these historic "pasted plate" patents. This, together with the fact that it is now conceded by many authorities that for many if not most purposes the unpatented Planté type of cell is the better, removes the chief obstacle in the storage battery development in this country. The fact that the companies have been too busy with litigation to attend to legitimate business has shaken the confidence of the public who naturally ask "where are your batteries in use?" the only and unsatisfactory answer to which is "abroad." Much "missionary work" must first be done before public confidence will be restored, and let us hope that the recently started "rental" companies will soon accomplish this. It is uphill work, but prospects at present seem bright and encouraging.

As the patent question has now been settled, and as cells of the Planté type have now been developed into practical forms, the storage battery outlook at present lies largely in the hands of the constructing engineer, and we should, therefore, look at the question from this standpoint.

The storage battery has for years had the reputation of being like a delicate, sickly baby, continually threatened with half a dozen diseases, and requiring the constant attendance of a trained nurse, besides the fatherly care and large purse of its manufacturer. To the user the five chief diseases of the accumulators appear to be: Buckling, short circuiting, sulphating, disintegration and dropping out of the peroxide. Many inventors have thought that most of these may be made uninjurious by a process of opposing or resisting their disastrous effects, as distinguished from preventing their occurrence, although the term "preventing" has incorrectly been used to describe it. Buckling has been opposed by main strength, and sometimes awkwardness, short circuiting by porous insulating sheets between the plates, falling out, by inclosing or locking the peroxide so that it cannot drop out, etc. Whether and how far such heroic methods have been successful can be determined only by tests, but it seems to the writer that many of the methods are like curing corns by cutting off one's feet—the cures may be effective, but can hardly be called satisfactory. To attempt to prevent the almost irresistible force of expansion of the peroxide from exercising itself by confining the material in an inelastic lead frame, is a formidable and it seems an almost hopeless, task; the inevitable result is that one or the other must give way; if it be the peroxide, it will ultimately be crumbled by the pressure; if it be the lead, there will probably be buckling or at least a separating of the contact surfaces at the subsequent contraction of the peroxide, and this inevitably results in the formation of that very objectionable layer of white sulphate which practically insulates the active material from its conductor, the consequences of which are sure to be fatal. The development of the storage battery has been greatly retarded by the fact that it was in the hands of mechanical engineers instead of chemists.

The careful constructor should attack the problem in a different way; he should go back to the beginning to find out the prime causes, and then prevent, if possible, these causes from arising, rather than to attempt to oppose their effect by sheer force and awkwardness. These causes seem now to be understood, and the question therefore is how to prevent them. One way is to supply with each battery a printed and neatly framed long list of "don'ts" or limitations in the form of rules telling you what you must not do, with a foot note attached, saying that the company's guarantee ceases if these rules are violated. This may be satisfactory to the company, but certainly not to the user. A more satisfactory way would be to construct the plates, if possible, so that these prime causes of trouble cannot arise, no matter what mistakes the attendant may make or what emergencies the battery may be called upon to meet—within reasonable limits of course. To discuss all these prime causes in detail would require writing a treatise on the subject, but they may be summarized briefly and their prevention will then suggest itself.

The chief evil effects are apparently caused by too rapid charging and discharging. With many of the favorite methods of avoiding the effects of high rates, the capacity and efficiency at such rates both become so low that the user will be discouraged from discharging so fast, and the current will fall so rapidly that it will have little chance to do much mischief. Such methods are applicable only when rapid rates are never desired, but those cases are the exception, rapid rates, or at least a provision for them, being generally very desirable and often essential as in traction work, for instance; such methods have therefore solved this problem only for a limited field. What should be done

is to try to construct the plates so that they are adapted to high rates without a great loss of efficiency or capacity. It will be found that in the majority of cases in which the storage battery would be of special value, it is a question of *rate* rather than *capacity*, that is, a great horse-power for a short time is more often required than a large quantity of energy delivered at a slow rate; it seems from a number of cases, about which the writer has recently been consulted, that any capacity above that which is obtained at a one, two or three-hour discharge is generally of comparatively little value.

To study the effects of rapid discharges it must be remembered that the acid is as important as the lead oxides; when its density falls too low there will be a lowering of the electro-motive force; acid is withdrawn from the solution during discharge, hence the diluted acid in the fine pores of the active material must get out and denser acid must get in; but the only force which does this is the difference between their specific gravities and, as this is very small, the force will be small, and therefore the circulation will be slow, which in turn reduces the electro-motive force. The chemical action will, therefore, be confined chiefly to the external surface, which is freely exposed to the acid, and the action then becomes so great per unit of surface, that white sulphating, or, better, complete sulphating, takes place. If a rapid discharge is not to injure the plates nor lower the voltage by reason of the acid in the pores becoming too dilute the circulation must be rapid; great porosity accomplishes this partly, but is attended by frailty and poor conductivity of the peroxide, which again results in a fall of the voltage. The ideal method would, therefore, seem to be a vertical lead plate to act as a good conductor, with an extremely large surface, and a very thin layer of peroxide on it, freely exposed to a large quantity of acid, which is capable of circulating rapidly. That such a plate may be made to have a greater capacity per pound of plate for rapid discharges, and, perhaps, an equal one for slow discharges, as compared with the best thick, porous plates, has been shown by experiments. The great capacity is doubtless due to the fact that the active material is more completely utilized, as it is all close to the conductor and freely exposed to the acid. The capacity of such a plate will evidently be affected only slightly by the rate and the loss of voltage; and, therefore, the watt efficiency will depend more on the conductivity of the lead than on the acid becoming too dilute in the immediate neighborhood of the active material. To obtain high rates, accompanied by good efficiency and capacity, there is little doubt that the best way is to use large surfaces rather than to try to resist the evil effects of high rates mechanically.

In rapid charging the acid becomes too dense in the pores of a thick mass of active material if the circulation does not keep pace with the demand. This dense acid softens the peroxide, and there is a tendency to form gases when the proper chemical action cannot keep pace with the current. Both the softening and the mechanical effects of the gases are injurious. What was said regarding porosity and the ideal plate applies, therefore, also to the charging.

The negative plates being soft and tough, are not so easily injured, but unless the acid can circulate very freely, there will still be a lowering of the voltage like with the positive plates, and probably also a lowering of the ampere-hour capacity.

The contact between the peroxide and its conductor must be very good, for, if poor, then a white sulphate forms at the surface, which practically produces an insulating layer, and disastrous effects are then inevitable. The ideal contact is obtained when the peroxide is formed on the lead electrolytically, as in the Planté processes.

The peroxide will insist on expanding during the discharge and on contracting during the charge. It would be much better to accept this as an inevitable fact than to try to keep the material from obeying the laws of nature by forcibly confining it within an inelastic frame, as many inventors have attempted to do; the results of such an attempt have already been described. To hold a large mass of active material firmly in contact with a lead conductor, when one expands and contracts while the other does not, or expands without afterwards contracting again—is a difficult matter. The best solution seems to be, to have the active material in the form of an extremely thin layer over a large surface and formed from the lead itself, as this increases its adhering properties. If such a layer can be made porous and if the surface be made up of small facets, there will be little tendency to buckling or scaling.

The gradual washing away of the surface of the peroxide, and the slow peroxidation and consequent disintegration of the lead support, seem to be absolutely unavoidable. Until some preventive is found, if it ever will be, it seems wisest to accept the inevitable and acknowledge that the positive plates are perishable. To use any other metals or carbon is out of the question; the addition of antimony to the lead seems to retard but does not prevent peroxidation. The favorite method of trying to avoid the effects of disintegration is to make the frames of the positive plates quite thick, thus prolonging their life. This, if not accompanied by other disadvantages, may be satisfactory for stationary plants in which the great additional weight is no hindrance, the only objection to it being the cost of the metal, which is no small factor in the total cost of the plate. But such a method is certainly not satisfactory for cheap or portable cells, and the gradual washing away of the peroxide remains the same whether the frame is heavy or light, provided that the surface exposed to the liquid is the same.

(To be concluded.)

A foreign exchange announces that Mr. Emanuele Jona, an Italian engineer, has written a book on submarine telegraphy. It is hoped that the author's name will not affect the sale of the book.

The Deflected Arc System of Electric Welding.

Mr. T. Scott Anderson, of Sheffield, England, has recently introduced a deflected arc system of electric welding which is illustrated and described by London *Engineering*. It is known as the Zerener system, and is founded on the well-known phenomenon of the deflection of the electric arc by a magnet. The mutual action of an electric current and a magnet is, of course, the basis of dynamos, galvanometers, and of most forms of electric instruments, but the effect is nowhere so strikingly shown as when a powerful electro-magnet is placed beside an arc playing between two carbon points. The arc is then driven outwards until it resembles a blowpipe flame, and can be used as such, but with this difference, that the temperature is enormously higher. It will be readily imagined that with this flame some very difficult jobs in soldering, brazing and welding can be attacked with much better prospects of success than if any other means are employed.

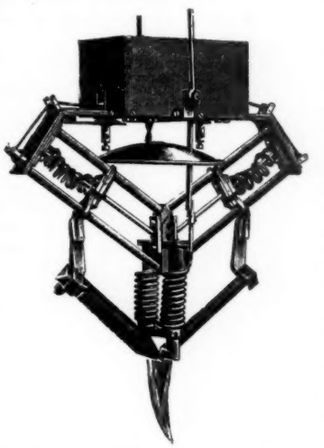

FIG. 1.—SMALLER FORM OF ZERENER ELECTRIC WELDING MACHINE.

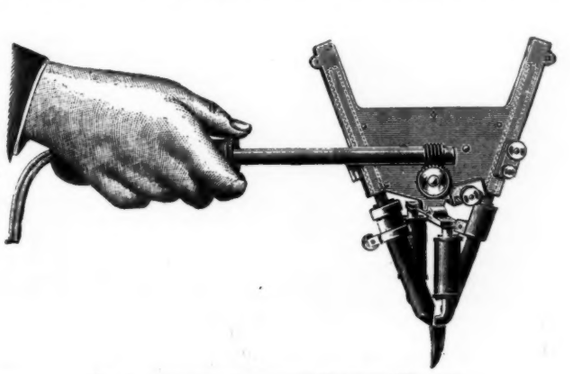

FIG. 2.—ZERENER AUTOMATIC ELECTRIC WELDER.

There are two forms of apparatus for applying the deflected arc, according to the size and power of the flame required. Fig. 1 shows the smaller form. The current passes from carbon to carbon, forming the arc, and the feed is arranged by means of a small thumb-spring. By means of the horseshoe electro-magnet, the position of which is adjustable, the arc is deflected at will to any position, and the heat is thus spread over any desired area. One of the smallest of these plants, operated by one workman, and driven by a five indicated horse-power engine, has made 2,000 brazes in a week of 54 hours. Tubes of brass, copper, aluminum, steel and iron have been thus brazed as brass to brass, copper to copper, or as copper to steel, brass to iron, etc.

A large number of trials have been successfully carried out to meet the requirements of the cycle trade, and two complete plants for this work are already in use.

In large work the automatic apparatus is used (Fig. 2); the principle is precisely the same, but here an automatic arrangement is employed for feeding the carbons, and, instead of the apparatus being held by the workman, it is suspended or placed in any position required. A considerable amount of work has been done by this large plant, which varies from 150 to 300 amperes output. Steel pipes from one-eighth inch to one-half inch thick have been longitudinally welded, the rate of work comparing favorably with the present system of riveting. Deck plates up to five-eighths inch thick have been satisfactorily welded, and a plant for this particular work, and also the ordinary requirements of a shipyard, is being erected.

Seam welding is probably the finest production of the deflected arc system; we have before us a sample weld in a plate one-sixteenth-inch thick, 34 inches long and one-eighth inch wide, seam welded from top to bottom. Another application of the system is the production of hardened and tempered sections for reaping machines, the work being done by a slightly different machine.

For ordinary machine repairs, castings, boiler plates, locomotive shop works, etc., the system is equally suitable. The plant required for such operations is of a simple description; no accumulators are necessary, and where a lighting plant is installed of suitable output, the cost of accessories is not large. The portability of the apparatus is a great advantage; any work can be carried on *in situ*, and the extensive range of work possible by one plant should lead to very considerable application, more particularly where the ordinary methods of welding are impracticable.

Chicago Electrical Association.

The programme of papers to be read before the Chicago Electrical Association includes the following: December 20, "What Next in Electric Railway Work?" by J. R. Cravath; January 3, "The Protection of an Invention," by W. Clyde Jones; January 17, "Armature Windings for Multipolar Generators," by F. A. Muschenheim; February 6, "Lightning Arresters," by W. R. Garton; February 20, "The Outlook for Electro-chemistry," by Bertrand S. Summers.

A flywheel, 28 feet in diameter and weighing 180,000 pounds, was recently shipped from Philadelphia to Joliet, Ill. This is said to be the largest single piece of machinery ever sent across the country.

ADVANCE INFORMATION.

VALUABLE INFORMATION FOR MANUFACTURERS AND DEALERS.

We publish below the earliest information obtainable relating to new electric railways, new electric light companies, new telephone companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW from week to week.

Electric Light and Power.

VANCOUVER, B. C. — A 10-year contract for arc street lighting has been let to the Western Electric Lighting, Heat and Power Company, a branch of the Western Electric Company, of Chicago.

VEVAY, IND.—The City Council has made a contract with Alex. S. Schulman, of Cincinnati, for putting in an electric light plant.

KANSAS CITY, MO.—Mr. C. W. Baker, a practical electrician of this place, has purchased the electric light plant here and will operate under the name of the Western Lighting Company. He will furnish the city with lights.

MILLIS, MASS.—Dr. C. W. Emerson has added a new eight horse-power engine to his electric light plant.

MIDDLETOWN, CONN. — The contract for lighting the new bridge between this city and Portland has been awarded by the Berlin Iron Bridge Company to the Middletown Electric Light Company, and General Manager Stow is at present busily engaged in preparing for the work that is to be done. A cable is to be laid across the river on the bottom to furnish the power. The incandescent system of lighting will be employed.

SANTA MONICA, CAL.—With the new electric lighting plant at the Soldiers' Home of this place a coil steam condenser has been put in, by which 50,000 gallons of water daily will be produced from the exhausted steam.

JAMAICA, N. Y.—Long Island Illuminating Company has been incorporated by Charles A. Lockwood, Jamaica; R. F. Rhodes, J. H. Holmes, J. S. Jones, E. E. Seaman, Brooklyn, to manufacture gas and electricity for use in Flatlands, Jamaica and Richmond Rill. Capital stock, $100,000.

PORT JEFFERSON, N. Y.—Port Jefferson Electric Light Company has been incorporated by W. T. Wheeler, M. L. Chambers, Wilson Ritch, Simon Dreyer. Capital stock, $7,500.

SAN ANTONIO, TEX. — The San Antonio Edison Company has leas site for a power plant to cost $250,000.

PLANO, ILL.—Henning & Ross, of Chicago, have been granted a five-year franchise to construct an electric li_ht plant at Plano.

COPEMISH, MICH.—Steps are being taken to construct an electric light plant.

SPOKANE, WASH.—St. Mary Piping Company has been incorporated by H. S. Voorhees, J. L. Willson, R. H. Voorhees, J. H. Burke, T. E. Jefferson, H. L. Willson, to erect and operate electric light and power stations, and engage in other enterprises. Capital stock, $500,000.

FOREST GROVE, ORE.—The electric light plant is to be sold to private parties.

BRONSON, MICH.—The new electric light plant at this place will be completed by January 1. Quincy will then be the only village in the county of any pretensions without an electric light plant.

SHEFFIELD, ALA.—The authorities are about to issue $50,000 six per cent 30-year bonds, the money to be expended for waterworks and electric light plant.

RIDLEY PARK, PA.—Application is to be made for a charter of a corporation to be known as the Ridley Park Light, Heat and Power Company. Frank R. Savidge is their solicitor. The incorporators are: Richard S. Pomeroy, Charles G. Dorrach, Job Smith, W. P. Anthony and Harry H. Sawyer.

GREENVILLE, N. C.—A new electric light plant will probably be established.

STANDISH, MICH. — A new electric light plant is being installed.

NEW YORK, N. Y.—The New Manhattan Athletic Club has purchased the ground on which it is built for $500,000. An entirely new electric plant will be put in.

TULLY, N. Y.—An electric light plant for lighting the village and business places here is being discussed.

CASEVILLE, MICH.—An electric light plant is to be established here.

MCKEES ROCKS, PA.—A charter has been issued to the McKees Rocks Electric Light Company; capital, $20,000. Directors, David Shaw, Robert Murdock, Al Young, McKees Rocks; Thos. S. Calhoon, Esplen, and Stephen Newburn, Bellevue.

CLIFTON, PA.—The contract to light the borough with electricity has been awarded to the Citizens' Electric Light Company, of this place. There are to be 40 lights furnished, and the poles for them will be erected as quickly as possible.

DYERSVILLE, IOWA.—A committee has been appointed to consider the advisability of establishing an electric light plant.

WOLCOTT, N. Y.—Omar M. Curtis has applied for franchise to construct an electric light plant.

TERRELL, TEX.—M. A. Joy is in the market for machinery to enlarge his electric light plant.

SEARCY, ARK.—M. G. Petty contemplates buying machinery for enlarging electric plant.

GAINESVILLE, FLA.—The Gainesville Woodenware Manufacturing Company is putting in an electric light plant.

PORT GIBSON, MISS.—The Mayor may be addressed for information concerning the construction of an electric light plant.

UNIONVILLE, MO.—An electric light plant will be established.

MALVERN, OHIO.—The city will issue bonds for an electric light plant.

GROTON, CONN.—Steps are being taken to establish an electric light plant.

New Manufacturing Companies.

PHŒNIX, N. Y.—The Phœnix Electric Company has been incorporated by R. S. Sloan, of Oswego; S. Dana Greene, of Schenectady; Geo. B. Leonard, of Syracuse, and others, to supply electricity in the village of Phœnix, Oswego county. Capital stock, $15,000.

JERSEY CITY, N. J.—Havana Abattoir Company, Havana, Cuba, has been incorporated by Horace Holden, of East Orange, N. J.; J. W. H. James, New Amsterdam Hotel, New York, N. Y.; Geo. W. McNulty, New York, to operate plants by horse, steam or electricity, and also transmit electricity for light, heat and power in Jersey City, N. J. Capital stock, $1,000,000, with $1,000 paid in.

NEW YORK, N. Y.—The Niagara Electric Chemical Company has been incorporated by Hamilton Y. Castner, of London, Eng.; Jacob Hasslacher, of New York city; Franz Roessler, of Perth Amboy, N. J., and Wm. A. Haman, of Mount Vernon. Capital stock, $100,000.

PORTLAND, ME.—The National Electric Carbon and Manufacturing Company has been incorporated for the purpose of manufacturing, buying and selling carbon machines and carbons, with $500,000 capital stock, of which nothing is paid in. The officers are: President, William A. Holmes, of Boston; treasurer, Charles F. Clark, of Boston.

CLEVELAND, OHIO.—The American Machine Company has been incorporated by Frank Mock, Theodore Bucker, M. D. Williams and others, to manufacture electrical machines, machinery supplies, power and hand motors, etc. Capital stock, $100,000.

JERSEY CITY, N. J.—Live Wire Cut-Out Company has been incorporated by William Kennon Jewett, New York city; Henry K. Wight, Springfield, Mass.; Robt. M. Dixon, East Orange, N. J., to manufacture appliances for street railway and electric light purposes. Capital stock, $250,000.

GREENBUSH, N. Y.—The Erwin Manufacturing Company has been incorporated with a capital stock of $5,000. The company will deal in mechanical and electrical supplies. John Erwin, W. W. Grey and R. J. Pratt are the directors.

KANSAS CITY, MO.—The Kansas City Telephone Exchange has been organized for the purpose of manufacturing telephone instruments in this city. The articles of incorporation, which have been filed in the recorder's office, give the capital stock as $200,000, divided into 400 shares, of the par value of $50 each. The stockholders named are David Caulkins, R. J. Pratt, J. N. Davis, A. M. Allen, W. F. Allen and H. K. Rowley. Mr. Pratt was for 12 years Bradstreet's representative in Kansas City. He is now an agent for Eastern capital, with offices in the American Bank building. The Messrs. Allen are attorneys, with offices in the Temple block.

New Electric Railways.

BROWNSVILLE, PA.—The Pittsburgh & Monongahela Traction Company has been incorporated, with M. G. Bulger, president, Brownsville; H. C. Johnson, director, Pittsburgh, to construct a street railway between West Elizabeth and Brownsville. Capital stock, $12,000.

BROOKLYN, N. Y.—The Brooklyn Bridge, Prospect Park & Eastern Railway Company, of Brooklyn, to run a street surface electric road about 45 miles in length in the city of Brooklyn. Capital $500,000. Directors, A. N. Brady, Albany; J. H. Pettit, Brooklyn; Fred S. Flower, Edward Browne, B. A. Place, J. K. Kenney, C. H. Werner, G. M. Curtis, Jr., and W. H. Turner, of New York city.

HAGERSTOWN, MD.—Hagerstown & Potomac Electric Railway Company has filed for record a mortgage for $200,000 to secure an issue of bonds to build the railway. Harrisburg Trust Company named as trustees.

SAN BERNARDINO, CAL.—A new electric line will be established shortly.

CROTON, N. Y.—It is now proposed to run the new electric railroad through the Van Wyck and Van Courtlandt farms, and not along the public highway, as first talked of. It is stated that the New York & Putnam Railroad proposes to try an electric motor on that line, and if it prove a success the entire road will be equipped and run by electricity.

AKRON, OHIO.—The Akron Street Railway Company and the Akron General Electric Company's plants have been sold to New York capitalists for $1,200,000. The syndicate is headed by Senator Brice's partner.

PATERSON, N. J.—The certificate of the incorporation of the Kaltenbach Car Fender Company has been filed. The authorized capital stock is $400,000, of which $300,000 has been paid in. William H. Kaltenbach, Charles C. Kaufman, Thomas Winter, Everet G. Kaufman and Frank Kaufman are the stockholders. Business will be conducted in Passaic City.

CHICAGO, ILL.—All of the new motor cars being built for the North Side electric lines are vestibuled for the protection of the motor man. All of the motor cars now in use and without vestibules will be so equipped rapidly.

CHICO, CAL.—A new electric railroad will probably be constructed from Biggs to Pelermo and Honcut.

CINCINNATI, OHIO.—The Consolidated Street Railway Company has commenced the erection of a large plant for the building of its own cars. Three hundred men will be employed.

NEW HAVEN, CONN.—The management of the New York, New Haven & Hartford road has in contemplation the electrical equipment of a line between Hartford and New Britain, which is likely to be the first combination of steam and electric motive power to be used in the State.

New Telephone and Telegraph Companies.

PAWTUCKET, R. I.—The American Telephone and Telegraph Company has stopped the use of its long-distance wire from this city to Boston, and thus severed all communication between this city and points in New England north of it.

CRANFORD, N. J.—Another effort for the establishment of a New York and New Jersey Telephone Exchange at this place is on foot.

FULTON, N. Y.—The Western Union Telegraph Company is to improve its service by putting district messenger call boxes in the offices of the principal patrons.

SENECA FALLS, N. Y.—The Postal Telegraph Company is now in successful operation here, under the efficient management of Earl Peck.

SILVER SPRINGS, N. Y.—The B., R. & P. is making extensive repairs on their telegraph lines.

UTICA, N. Y.—The Central New York Telephone Company has completed the extension of its long-distance line from this place to Watertown.

BLOOMINGTON, ILL.—The Mutual Telephone Company has been incorporated; capital stock, $1,500; to operate telephones. Incorporators, Deane M. Funk, E. D. Funk, Jacob Funk and E. F. Funk.

SUSQUEHANNA, PA.—There is a probability that a telephone line connecting this place, Montrose, Great Bend and Halstead with the Postal Telegraph office in New Milford will be established Should this service prove profitable to the company, loops will be put in the main line, connecting the above places, and regular telegraphic service established.

DETROIT, MICH.—The Southern Michigan Telephone Company, with its main office at Athens, now has over 40 different offices throughout that part of the State.

EASTHAMPTON, MASS.—The New England Telephone Exchange office has been completed and L. W. Baldwin put in charge.

LEE, MASS.—A telephone line is to be run from this place to Otis.

WARREN, ME.—The telephone line has been completed to this place, where it connects with everything east and west, and the local circuit is ready for the instruments.

PHILADELPHIA, PA.—Philadelphia Standard Telephone and Telegraph Company has been incorporated with Richard W. Clay as treasurer; capital stock, $10,000.

CHICAGO, ILL.—The United Telegraph and Electric Company has established an exchange in this place, and offers its services for $36 per year.

The Standard Dictionary.

To the Editor of Electrical Review:

A very grave wrong is being perpetrated against the American public by a reprinter of one of the English competitors of the Funk & Wagnalls Standard Dictionary—a wrong that cannot be excused by the exigencies of commercial rivalry. As is well known, in all unabridged dictionaries, it is necessary to give the definitions of certain indelicate words. Eighteen of these words (selected out of a vocabulary of over 300,000 terms in the Standard) have been collated and printed with their definitions by the reprinter of this English dictionary, and circulars containing them are being distributed among teachers, school trustees and parents all through this country, stirring up a filthy agitation that will end, unless frowned down by the public press and other leaders of public opinion, in setting people of prurient minds and children everywhere to ransacking dictionaries for this class of words. One of these publications contains such outrageously unjust comments as the following:

About two years ago the publishing house of Funk & Wagnalls brought into the world a monstrosity entitled the Standard Dictionary of the English Language.

So far as it relates to its collection of obscene, filthy, blasphemous slang and profane words, it has no counterpart in dictionaries of the English language.

It is but fair to the press and scholars of England to say that the English critics have in no way seconded this unfair assault, but are unanimous in the most unqualified indorsement of the American work, the Standard Dictionary, expressing in many ways the same opinion as that of the *St. James's Budget* (weekly edition of the *St. James's Gazette*), London, which said:

To say that it is perfect in form and scope is not extravagance of praise, and to say that it is the most valuable dictionary of the English language is but to repeat the obvious. The Standard Dictionary should be the pride of literary America as it is the admiration of literary England.

The utter insincerity of this attack on the Standard is seen in the fact that nearly every one of these 18 words is in the English work, which is published by this reprinter, and it contains other words so grossly indelicate and withal so rarely used as to have been excluded from the Standard and from nearly all the other dictionaries. Fifteen out of the 18 words (and others of the same class) are, and properly so, in the Century Dictionary, and they are to be found, with scarcely an exception, in every other reputable unabridged dictionary, and this class of words is invariably recorded in the leading dictionaries of all languages.

Since this gross attack has been made we have submitted to Charles A. Dana and to a number of well-known educators the question whether we committed an error in admitting into the Standard this class of words. The answer has been without an exception, "You did not."

The fact is, extraordinary care was used by the editors of the Standard "to protect the language." Of the more than 500,000 words collected by the hundreds of readers employed to search all books of merit from Chaucer's time to the present, over 200,000 *were excluded wholly from the vocabulary;* hence there was no need and no effort to pad the vocabulary. The rules of exclusion and inclusion were most carefully made and rigidly enforced. A most perplexing problem from beginning to end was how to reduce the vocabulary, not how to enlarge it. Compression was carried by many devices to the extremest degree. The editors who passed upon the admission of words numbered over 100 of the best known writers and scholars in America and England. To accuse such men of "filthiness" is to do a wrong of the gravest degree. It is the business of a dictionary to record words, not to create nor to destroy them; to answer inquiries concerning the spelling, pronunciation and meaning of all words that are used to any considerable extent, not to obliterate those it does not fancy. Whether a word has a right to exist or not, the final arbiter is the people, not the dictionary. The dictionary, as says Trench, should be the inventory of the language, and, as says the Encyclopedia Britannica under the term Dictionary, it—

Should include all of the words of the language. . . . A complete and Standard Dictionary should make no choice. Words obsolete and newly coined, barbarous, vulgar and affected, temporary, provincial and local, belonging to peculiar classes, professions, pursuits and trades, should all find their place—the only question being as to the evidence of their existence—not, indeed, all received with equal honor and regard, but with their characteristics and defects duly noted and pointed out.

Improper or indelicate words, when it was found necessary to admit them into the Standard, were blacklisted as *low, vulgar slang,* and printed in small type. It did not seem to the editors that an unabridged dictionary could go further without justly incurring blame.

To collect from such a work words of the class referred to and publish them is as great an outrage as to collect from the Bible the many indelicate words and passages to be found there, or those from Shakespeare (some of these 18 words are found both in the Bible and in Shakespeare), and then to print and scatter abroad the collection, saying: "See what a foul book is the Bible; see what an obscene and blasphemous work is Shakespeare." The publication and distribution of these circulars is a gross assault upon public decency. An agent who attempts to exhibit such a printed circular surely should not be listened to for a moment; he is a public enemy, and should be turned from every decent door.

The old story will be remembered of a woman accosting Samuel Johnson, shortly after his dictionary had been published, with: "Dr. Johnson, I am so sorry that you put in your dictionary the naughty words." "Madam," retorted the Doctor, "I am sorry that you have been looking for them."

Respectfully,
I. K. Funk.

New York, December 9, 1895.

New Light on the Grove Battery.

Chemists used to be very fond of ascribing reactions, which they experienced some difficulty in explaining, to "catalytic action"—a conveniently vague term which is almost Gladstonian, says the London *Electrical Review.* We have not quite done with it yet, although the time is probably not far distant when this rather weak term will be supplanted by something more understandable. For the present, however, it is still thought desirable to retain it. In a recent issue of the *Electrotechnik und Elektrochemie,* 1895, II., p. 174, Ihle calls attention to a form of catalytic action which, apparently, can be recognized in the Grove cell. He finds that if the concentrated nitric acid in a cell of this type be gradually diluted with water, the electromotive force of the cell remains approximately constant and equal to 1.8 volt until 38 per cent of nitric acid is present. A little below this concentration the cell gives an electromotive force roughly corresponding to that of a Smee cell (0.7 volt), although at first it only exhibits this lower electromotive force for a short time. When the amount of nitric acid present is reduced to 27—28 per cent, the electromotive force of the cell remains permanently at the lower value. Ihle is of opinion that this remarkable phenomenon is due to the action of nitrous acid, which is either contained in the nitric acid to start with or else is formed in it when the circuit is closed. Support for this view may be found from the following experiments: If a Grove cell be used which contains less than 28 per cent of nitric acid, and, therefore, exhibits permanently an electromotive force equivalent to that of a Smee cell, and a small quantity of potassium nitrate be added, the electromotive force instantly rises to that of the normal Grove cell. On removing the nitrous acid by adding potassium permanganate or urea, the electromotive force again sinks to that of the Smee cell. And even with more concentrated nitric acid the depolarizing power can be annulled if the nitrous acid be removed by similar chemical means, the electromotive force then falling to that of a Smee cell. With acid containing over 50 per cent of nitric acid this can only be done for a short time, but with acid containing 50 to 38 per cent the effect is permanent. From these observations Ihle argues that depolarization in the Grove cell takes place, seemingly by a catalytic action of nitrous acid. It may be remembered that V. H. Velley has observed an analogous phenomena, so that it is to be hoped that these new results may stimulate further research.

The residents of East Taunton, Mass., are in hopes that next season the electric railroad company will extend its lines to that village.

Phœnix Carbon Manufacturing Company.

At the annual meeting of the board of directors of the Phœnix Carbon Manufacturing Company, of St. Louis, held on December 10, it was unanimously decided that, in view of the increase of business and the future outlook in all departments of the company's business, the capital stock be increased from $100,000 to $250,000. The Phœnix company is incorporated under the Missouri laws and its original capital of $100,000 was fully paid in. The increase of capitalization will be used for extension and enlargement of the present plant and to give better facilities for a rapidly growing business.

The officers of the Phœnix Carbon Manufacturing Company are S. M. Dodd, president; S. B. Pike, vice-president and general manager; H. L. Page, secretary and treasurer, and S. G. Booker, superintendent. The board of directors is composed of S. M. Dodd, president Missouri Electric Light and Power Company; James Campbell, banker and broker; J. C. Van Blarcom, cashier National Bank of Commerce in St. Louis; Thos. H. West, president St. Louis Trust Company, and S. B. Pike, secretary and treasurer Wagner Electric Manufacturing Company.

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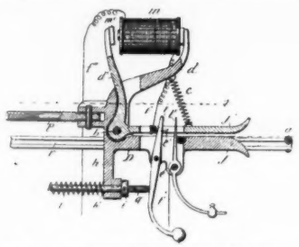
ELECTRICAL PATENTS

ISSUED DECEMBER 10, 1895.

550,950 Paper registering machine; T. C. Dexter, Pearl River, New York.—Comprises a reciprocating gripper having its jaws held normally in an open position, an electro-magnet causing by the attraction of its armature to close said jaws, a normally open electric circuit and a circuit closer in the path of the paper to be actuated thereby.



550,950.—PAPER REGISTERING MACHINE.

550,956 Carbon-holder for arc lamps; H. J. Farley, Philadelphia, Pa.—Consists of a casing having an interior base flange and a plurality of longitudinally extending openings, spring fingers riveted to the casing and projecting through the openings within the tube.

550,959 Electric clock; B. Franklin, Chicago, Ill.

550,965 Electrical conduit railway; J. D. Griffen, New York, N. Y.—Consists of a conduit having the usual slot, a trolley wire and a trolley arm, a carriage for the trolley arm, rollers in said carriage adapted to engage the sides of the slot, ball boxes in which said rollers are journaled and which are provided with hubs, and springs engaging said hubs and acting to hold the rollers in contact with the sides of the slot with a yielding pressure.

550,982 Harmonic selective signal for party telephone lines; J. Lighthipe, San Francisco, Cal.

551,014 Electric smelting furnace; J. A. Vincent, Philadelphia, Pa.

551,020 Electro-magnet; S. T. Wellman, Upland, Pa.—Consists of a top plate, two poles of the magnet secured thereto, wrappings of wire for each pole, a bottom plate through which the cores extend, and a shell mounted between the top and bottom plates and surrounding the wrappings of the magnet.

551,021 Electric rail bond; W. H. Wiggin, Worcester, Mass.

551,029 Electric arc lamp; W. J. Davy, London, Eng.

551,032 Cleat for electric wiring; J. R. Hemphill, Akron, Ohio.—A cleat for electric wiring having a wire-receiving recess, tapered or reduced in width toward its

551,032.—CLEAT.

inner end and having one of its walls dentated so as to hold a wire.

551,033 Commutator brush; R. Hirsch, Milwaukee, Wis.—Composed of alternating strips or sections of carbon or a carbonaceous composition, and strips or sections of metal offset or inclined to the plane of rotation of the commutator so as to present thereto a continuous and approximately uniform area of metallic contact.

551,046 Electric arc lamp; F. N. Pike, New York, N. Y.

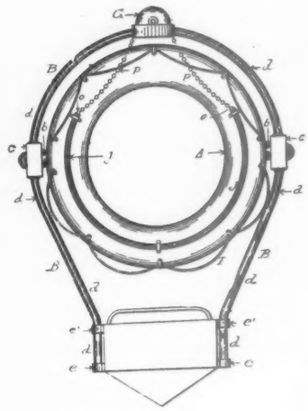
551,053 Electric controller; S. H. Short, Cleveland, Ohio.—Consists of a series of rotary contacts made of magnetic material and a series of magnet poles arranged with relation to said contacts whereby a complete magnet circuit comprises two of said magnet poles and two of said contacts, and contact fingers having their free ends located within the magnetic fields thus produced.

551,056 Multiple switchboard system; T. Spencer, Cambridge, Mass.

551,060 Telephone circuit; J. S. Stone, Boston, Mass.

551,076 Switch stand; F. F. Culver, New York, N. Y.

551,081 Marine life-saving apparatus; J. A. Guest and H. H. Bates, Washington, D. C.—Consists of a frame and a float movable one in relation to the other, an electric lamp and a source of electric energy carried by the buoy and a switch included in circuit with the lamp and source of elec-



551,081.—MARINE LIFE-SAVING APPARATUS.

tric energy and adapted to be closed by the relative movements of the frame and float.

551,087 Mail collecting system; C. F. Munson, Baltimore, Md.—A system whereby the opening of any mail box is announced in a central office.

551,090 Signaling apparatus; B. J. Noyes, Boston, Mass.

551,124 Successive non-interfering signal box; W. H. Kirnan, Brooklyn, N. Y.—Consists of a circuit controller, a normally wound motor therefor, a releasing device for the motor, a magnet in the signal circuit at the transmitter, a normal short circuit for the magnet and a circuit breaker operated by the first movement of the transmitter.

551,145 Switch for underground electric railways; A. Rosenholz, San Francisco, Cal.—Consists of a magnetic core projecting from the main conductor, a sealed casing therefor fulcrumed and turnable about the main conductor, journals or bearings upon which the casing is movable, a flexible insulating sheath or jacket inclosing the conductor and core and an exterior filling or packing surrounding the sheath.

551,166 R. S. Kelsch, Chicago, Ill.—Joint for insulated electric wires.

551,168 Trolley; D. Lippy, Mansfield, Ohio.—Consists of a pivoted mast, two parallel rods, two bars slidingly mounted upon the rods, connections between the bars and mast, and coiled springs on the rods engaging the bars.

551,169 Trolley; D. Lippy, Mansfield, Ohio.—Consists of a pivoted mast, a shaft having two radial arms, connected with the mast, and a coiled spring for rotating the shaft.

551,170 Switch for electric plants; A. H. Lucas, Pittsburgh, Pa.

551,192 Telegraph relay; A. D. McDonald, Melbourne, Victoria.

551,203 Electric switch; J. E. Criggal, Springfield, Mass.

551,230 Composition of matter for insulating purposes; R. N. Platt, Hartford, Conn.—An electrical insulating composition consisting of dense hard rubber, laminated mica and fibrous asbestos combined.

551,244 Electric arc lamp; W. P. Wiemann, Washington, Pa.—Consists of an arc lamp with the rod-controlling mechanism, a releasing point therefor, and means for automatically changing its position as the carbon decreases in weight.

551,263 Anti-sparkle commutator compound; J. R. Davis, New Iberia, La.—Contains sperm and graphite mixed together.

551,275 Telephone transmitter; J. Goodman, Louisville, Ky.

551,284 Electric sunshine annunciator; L. Hunt, St. Louis, Mo.—Comprises a pair of balanced bulbs partially filled with liquid, with connecting tubes at their lower ends, a block fixed to the longitudinal center of said tubes, a screw mounted in the upper end of said block, a knife-edged plate carried by said screw and passing through a slot in the upper end of said block and uprights upon which said knife-edged plate engages.

551,334 Electric railway; R. Lundell, Brooklyn, N. Y.

551,337 Electrode for arc lamps; T. G. Portis, St. Louis, Mo.—A pair of electrodes of an arc lamp having their arc ends lightly coated and their outer ends heavily coated.

551,347 Telephone receiver; A. C. Brown, London, England.

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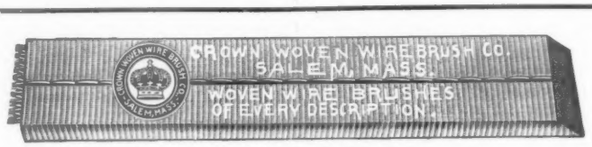

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